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Three Essays on Laboratory and Field Experimental Economics

Guanlin Gao

ABSTRACT

THREE ESSAYS ON LABORATORY AND FIELD EXPERIMENTAL ECONOMICS

BY

GUANLIN GAO

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Committee Chair: Dr. James Cox

Major Department: Economics

This dissertation explores what factors and institutions influence individual decision making and their economic impacts on the society, using approaches of laboratory and field experiments. The first essay addresses the effect of communication on cooperation. The second essay explores various types of public recognition, and their impacts on individual donation. The third essay studies how principals use their time in K-12 schools and the potential impact on student and school outcomes.

The first essay employs a laboratory experiment including three factors in human interactions, a noisy environment, indefinite length of interactions, and various levels of communication, to study what factors make individuals more cooperative. Results show that subjects are less cooperative in a noisy environment, and communication via fixed messages is not a remedy for the low cooperation rate in this noisy environment. However, communication via free messages leads to more cooperations, and it maintains cooperation rate at a high level over time.

The second essay is a joint work with Yefeng Chen, Haoran He, and Jun Luo. We conduct a field experiment to investigate how public recognition influences individual char-

itable giving. We design five treatments with distinct public recognition schemes and vary the timing when we offer opportunities of public recognition. Results show that both donation amount and participation rate are significantly higher when we mandate recognition. However, public recognition offered before donation crowds out small donations and thus lowers the participation rate. We claim that public recognition is a "double-edged sword" on individual charitable giving.

The third essay is a joint work with Mary Mira. We conduct a principal motion study in Fulton County, Georgia and shadow 30 school principals from all levels of public K-12 schools for two work days. We link our observational data with student performance data from state-wide standard scores. Results show that principals' time spend on building and maintaining school culture and school climate, as well as evaluating teachers and school staff are most positively related to student performance.

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BY

GUANLIN GAO

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ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics in the Andrew Young School of Policy Studies of Georgia State University.

Dissertation Chair: Dr. James Cox

Committee: Dr. Spencer Banzhaf
Dr. Michael McKee
Dr. Vjollca Sadiraj

Electronic Version Approved:

Mary Beth Walker, Dean
Andrew Young School of Policy Studies
Georgia State University
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Introduction

This dissertation explores what factors and institutions influence individual decision making and their economic impacts on the society, using approaches of laboratory and field experiments. The first essay addresses the effect of communication on cooperation. The second essay explores various types of public recognition, and their impacts on individual donation. The third essay studies how principals use their time in K-12 schools and the potential impact on student and school outcomes.

The first essay aims to understand what factors influence individuals' decisions when their private interests conflict with mutual benefits. This paper employs a laboratory experiment that includes three factors in human interactions: noisy environment, indefinite length of interaction, and various levels of communication. Results of this study show that subjects are less cooperative in a noisy environment, and communication via fixed messages is not a remedy for the low cooperation rate in this noisy environment. Although free message delivers similar contents of information on subject strategies, it leads to a distinct outcome compared to communicating through fixed messages. On the aggregated level, subjects are 32.2% more likely to cooperate with their partners when they can communicate freely, compared to no communication. Besides significantly increases cooperation between subjects, free communication also maintains the cooperation rate at a high level over time.

The second essay is a joint work with Yefeng Chen, Haoran He, and Jun Luo. We conducted a field experiment to investigate how public recognition influences individual charitable giving. We designed five treatments with distinct public recognition schemes and varied the timing when we offered opportunities of public recognition. Results of this study show that both the donation amount and participation rate are significantly higher when we mandated recognition. However, public recognition offered before donation crowds out small donations and thus lowers the participation rate. Therefore we claim that public recognition is a "double-edged sword" on individual charitable giving. This study aims to raise awareness of the proper use of public recognition as an approach to increase donation

in charitable fund-raising. It also provides evidence on individual behavior of charitable giving outside the laboratory.

The third essay is a joint work with Mary Mira. We conducted a principal motion study in Fulton County, Georgia and shadowed 30 school principals from all levels of public K-12 schools for two work days. We logged and coded principals' activities into 10 broad categories including instructional leadership, school climate, planning and assessment, organizational management, human resource management, teacher/staff evaluation, professionalism, communication and community relations, personal, and travel. We linked these observational data with student performance data from state-wide Criterion-Referenced Competency Tests (CRCT) and End of Course Tests (ECOT) scores in math and language. Results of this study show that (1) principal's leadership role contains multiple aspects, (2) principals' time use varies among different school levels and school characteristics, and (3) principals' time spend on building and maintaining school culture and school climate, as well as evaluating teachers and school staff have strong positive relations with student performance. These results suggest that principals should focus their work on building and maintaining a good school culture and school climate, as well as providing opportunities in school employee development, which will ultimately leads to better student academic outcomes.

On the whole, this dissertation employs laboratory and field experiments to study real world phenomenons. Results of this dissertation aim to provide practical insights for individuals as well as for policy makers.

Chapter 1

The Power of Words: A Laboratory Experiment on Communication and Cooperation

1.1 Introduction

In many situations, a central feature of human interaction is the conflict between cooperation, which creates mutual benefits, and individual opportunistic behavior, which is motivated by private interests. This conflict generates losses in the total social welfare if individuals choose to pursue their private gains. A classic example of this social dilemma is the prisoner's dilemma, where defect is the dominant strategy. There are a number of studies searching for ways to encourage cooperation, desiring to increase the total benefit for individuals and groups.

This paper employs a laboratory experiment to study how communication, noise and the length of interaction influence individual cooperation. The purpose of this study is to seek an efficient way to increase the gains from cooperation via low-cost communication. It aims to answer three research questions: (1) how cooperative individuals are in a noisy

environment, (2) does the level of communication affect individual decision on cooperation, and (3) do individuals learn to cooperate over time. This research contributes to the current literature by extending prisoner's dilemma game to include three main features of human interaction: noisy environment, stochastic length of interaction, and various levels of communication. First, in the noisy environment, what an individual intends to do may not be the actual outcome. There is a noise variant, which is a probability of nature, that makes the real outcome deviate from individual decision. Second, the indefinite length of interactions implies that subjects interact with other individuals for a period of time, but they do not know when exactly the entire interaction ends. This is implemented by having a random termination on each round of the interaction. Third, different levels of communication are implemented in the treatments of this experiment. In the baseline No-message treatment, subjects cannot communicate with anyone during the game. In the Fixed-message treatment, subjects have the option to exchange messages with their partners about their intentions and future moves. In the Free-message treatment, subjects can chat with their partners freely.

Results of this paper show that people are less cooperative in an environment with noise. Communication on intentions and future moves through fixed messages is not a remedy for low cooperation in this noisy environment. Cooperation rate in the Fixed-message treatment is not statistically different from that in the No-message treatment. However, free communication significantly increases cooperation between subjects, and it maintains the cooperation rate at a high level over time. The average cooperation rate in the Free-message treatment is 55.6%, and this is significantly higher compared to 24.6% in the No-message treatment and 24.5% in the Fixed-message treatment. Although communication is a "cheap-talk" per se, subjects are 32.2% more likely to cooperate with their partners when they can communicate freely with each other. Besides, subjects learn to coorperate over time. They adept their behaviors according to results from previous rounds, and they carry experience from the preivous game onto later ones.

The rest of this paper proceeds as follows. Section 2 reviews previous literature. Section 3 describes the experiment design. Section 4 presents the experiment results. Section 5 concludes. Experiment instructions, subject demographic data, selected subjects' messages and self-reported strategies are presented in the appendix.

1.2 Related Literature

One approach to increase individual cooperation in the prisoner's dilemma game is to increase the length of the game from one round to multiple rounds. Kreps et al. 1982 showed that people are more likely to cooperate in repeated games, since cooperation maximizes potential gains from future interactions. Evolutionary game theory further modifies the game length to include infinite number of rounds. According to Osborne and Rubinstein 1994, the game is infinite because players do not know when it ends exactly. Bó 2005 provides supporting evidence from a laboratory experiment. He concluded that by having a random termination rule, the possibility of future interaction led to more cooperation between subjects. Additionally, Bo and Fréchette 2011 found that subjects learned to cooperate over time in infinite games, especially when cooperation was a subgame perfect Nash equilibrium and risk dominance. Fudenberg et al. 2012 introduced a noise variant into the infinite prisoner's dilemma game. They found that in the noisy environment, subjects were more patient and lenient towards defection.

There is a relatively small body of literature that studies infinite prisoner's dilemma game. A few of them study different implementations of the random termination rule in laboratory experiments. For example, Normann and Wallace 2012 found that termination rules had no significant effect on average subject cooperation, although different rules might lead to diverse subject end-game behaviors. Fréchette and Yuksel 2013 found that in random-terminated repeated games, subjects were more willing to cooperate compared to in finite repeated games with payoff discounting. This paper implemented the random

termination rule by using payoff discounting followed by a random termination. According to Fréchette and Yuksel 2013, such method generates a relatively low cooperation rate compared to other implementations when cooperation is the subgame perfect equilibrium. Also, subject cooperation rate is relatively consistent over time in this game setting.

There are a number of studies aiming to promote fairness and efficiency in social welfare via communication. For example, Isaac and Walker 1988 found that communication significantly reduced free-riding behaviors in public good contribution games. They concluded that communication helped providing information and building credibilities, and it generated a non-reversible learning process. Recent works such as Xiao and Houser 2005 and Xiao and Houser 2009 found that in the one-shot dictator game, first movers chose fair distributions more often when second movers were able to send an ex post message to the first movers. Duffy and Feltovich 2006 compared individual action and message sent in the one-shot prisoner's dilemma game, and they concluded that messages aligned with actions led to better outcomes while messages contradicted with actions led to less efficient outcomes. Ben-Ner and Putterman 2009 introduced various types of communication in one-shot trust and investment games and found that ex ante communication promoted trust and trust worthiness. With communication, both truster and trustee favored proposals that were more fair and efficient over unequal ones. Researches show that communication also contributes to economic efficiency and fairness in repeated games. For example, Cooper and Lightle 2013 found that messages exchanged between employees and employers helped them choosing a better contract. They concluded that communication provided information and facilitated learning between subjects. This learning process even persisted after communication had stopped. Tullock 1999, Brosig 2002, and Cho 2013 studied the effect of communication on individual cooperation in repeated prisoner's dilemma games without noise. Results of these studies showed that generally communication encouraged cooperation and retained subject cooperation rate at higher levels. In such an environment with zero noise, subjects either have no incentive to lie, or the cost associated with lying is relatively

high since false communication can be easily detected and punished. However, subject are expected to behave differently in an environment with noise (Fudenberg et al. 2012). This paper includes a noise variant in the laboratory environment.

1.3 Experiment Design and Procedure

This experiment uses a standard two-person prisoner's dilemma game with the strategy set of $S_i = \{Cooperate, Defect\}$ for subject i. The static Nash equilibrium in the stage game is to always defect. The stage game is referred to as a round, and the supergame is referred to as a match. In this experiment, subjects play several matches, and each match contains multiple rounds. In each round, subjects are asked to choose between A, the cooperative choice, and B, the non-cooperative choice. This experiment adopts neutral language in order to avoid any framing effect. The payoffs associated with subject choices in each round are as in Table 1.1.

Table 1.1: Subject payoffs in each round

	A	B
A	0.6, 0.6	0, 1
B	1, 0	0.2, 0.2

At the beginning of this experiment, subjects are randomly paired into groups of two. The pairing stays the same during a match. After each match, subjects are re-paired with different individuals to play for another match. Upon subjects' completion of all the matches, the experimenter randomly selects one match in order to determine subject payments. Subjects are paid $10 for participation, in addition to what they made in the randomly selected match. The exchange rate is 1 experimental point = 3 US dollars. Subjects fill out a post experiment questionnaire, which includes questions on subject demographics and strategies they used in the game.

This experiment adds three features to the prisoner's dilemma game: a noise variant, a

random termination rule, and various levels of communication. The purpose of this experimental design is to include major components of human interactions. First, in the real world, the outcomes that we observe are usually influenced by noise. For example, a team member may argue that a technical problem prevented him from completing the group project on time. It might be true that his intention was to finish the work, but some unforeseen forces of nature such as a broken computer prevented him from completing the work on time. At other times, intentions that are motivated by self-interests may lead to outcomes that are beneficial to the group. The noise variant captures these perturbations caused by nature that make outcomes deviate from one's intentions. Another aspect of human interaction is that we live in a relatively small world, and we interact with the same person for a certain period of time. This interaction may end at a certain point of time, but neither party knows when it will end exactly. This indefinite length of interaction between individuals is implemented by a random termination rule in this experiment design. Subjects know that they will interact with one person at a time for a certain number of rounds, but they do not know when each interaction ends exactly. Also, this paper includes communication in the experiment design as a third feature from human interaction. This is implemented by employing various levels of communication in different treatments. The following discusses the experimental design of this paper in details.

1. Noise

The noise parameter ϵ is defined as the probability of a subject's intended move being altered by nature, and $\epsilon = 12.5\%$. In each round of the game, there is a 12.5% chance that a subject's choice is not implemented. In other words, $1 - \epsilon$ is the chance of realization. For example, if a subject chooses option A, 87.5% of the chance option A will be realized; for a 12.5% chance, option B will be realized. This probablity is independent for each individual in every round of a match. Subjects know whether their own choices have been implemented or not; however, they do not know if the their partner's choices have been implemented. In other words, subjects are only informed of the realized outcomes, without having any

information on the other party's intentions. Table 1.2 shows the expected subject payoffs in a round with noise. In the stage game with noise, defecting is still the equilibrium.

Table 1.2: Expected subject payoffs in each round with noise

	A	B
A	0.572, 0.572	0.103,0.853
B	0.853, 0.103	0.272, 0.272

The methodological advantage of including a noise variant is that it allows us to observe diverse strategies. As Fudenberg et al. 2012 claim, we can observe the counter factual of what could have happened if one party has a trembling hand. The practical advantage of including a noise variant is that such design is close to the real world, which helps us better understand how individuals behave outside the laboratory setting.

This experiment design also includes two treatments without noise, where $\epsilon = 0$. One of these treatments is No-message without noise (No msg. no noise), and the other treatment is Free-message without noise (Free msg. no noise). Except the value of ϵ, all other features are the same in these two treatments compared to their counterpart treatments.

2. Random termination rule

In each match, subjects play a total number of $N + X$ rounds. N denotes the number of fixed rounds, and $N = 8$. X denotes the number of indefinite rounds, and X is determined by a continuation rate of $\delta = 7/8$. In each match, subjects play at least 8 rounds, and after the 8^{th} round, whether there will be a following round depends on a probability of 7/8. δ is the discounting factor in rounds 1 to 8, and it can be interpreted as the continuation rate in round 9 and the following rounds.

To implement this random termination rule, a sequence of integers X_1, X_2, ..., X_8 was generated according to the continuation rate of $\delta = 7/8$. The matches in this experiment contain $8 + X_1$, $8 + X_2$, ..., $8 + X_8$ rounds from match 1 to match 8. I followed Fudenberg et al. 2012 in the number generating process. The sequence of numbers generated was 7,

5, 4, 4, 15, 5, 10, and 6. Therefore, each match contains 15, 13, 12, 12, 23, 13, 18, and 14 rounds, respectively. The average number of rounds is 15.

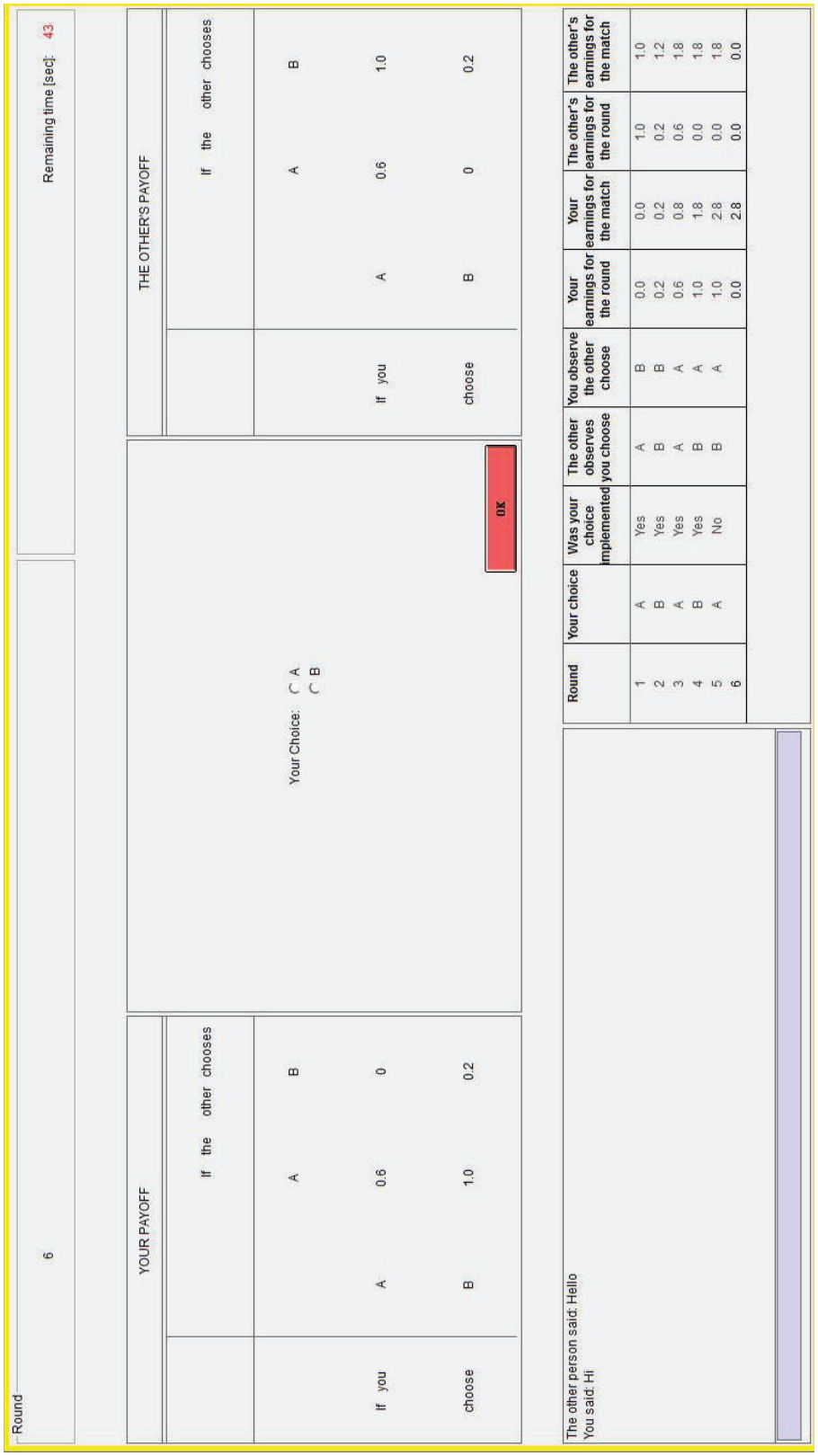
Subjects played all of the 8 matches in each treatment except in those treatments with free communication. In those treatments with free communication, subjects played the first 6 matches, because each match took longer in this treatment. The average number of rounds of the matches is 14.7 in the treatments with free communication.

3. Communication

This experiment includes five treatments with various levels of communication and noise. In the baseline No-message treatment (No msg.), subjects are not allowed to communicate with the other party at any time. In the Fixed-message treatment (Fixed msg.), subjects can exchange one message with the other party at the beginning of each round. They can select one out of the three predetermined messages: "I will choose A", "I will choose B", or "I prefer not to send a message" to send to the other party. The selected message will be delivered prior to subject decision. This gives subjects the chance to exchange information on their intentions and future moves before making a decision in each round. In the Free-message treatment (Free msg.), subjects can chat with the other party at any time during the match via free-style messages. They have up to 60 seconds to communicate and reach a decision in every round.

Subjects received full information on the noise level, the random termination rule, and the level of communication in the experiment instructions before they started the game. The experiment instructions can be found in Appendix A. Subjects had enough time to read the instructions. After all subjects had finished reading, the experimenter verbally summarized the instructions again before the experiment started. Other information was available to subjects as well, such as their own intended choices, whether their choices were implemented, the actual outcomes, one's own and the other party's earnings for the current round and match. These information was presented to subjects on their computer screens. Figure 1.1 provides a screenshot from a subject terminal in the Free-message treatment.

Figure 1.1: Subject screenshot in the Free-message Treatment



The purpose of this study is to understand what factors influence individual decisions in their daily interactions with others, and to seek an efficient way to promote cooperation. It aims to answer three research questions:

1. Are individuals less or more cooperative in a noisy environment?

2. Does communication promote cooperation?

3. Do subjects learn to cooperate over time?

1.4 Results

This experiment was conducted in the research laboratory of Experimental Economics Center at Georgia State University in September 2014. A total of 158 subjects participated in this experiment. All these participants were Georgia State undergraduate students recruited campus-wide. This experiment was computer-programmed and conducted using the software z-Tree (Fischbacher 2007). Subjects were paid for whatever they earned in a randomly selected match, plus a $10 participation fee. Subjects received cash payments immediately after the experiment. Table 1.3 provides some basic information of the experiment.

Table 1.3: Summary information

	# of	Matches	Rounds per match			Subject earnings ($)		
	Subjects	per session	avg	min	max	avg	min	max
No msg.	40	8	15	12	23	23.08	14.8	32.8
Fixed msg.	40	8	15	12	23	28.36	19.6	42.4
Free msg.	40	6	14.6	12	23	28.53	16.6	35.8
No msg. no noise	20	8	15	12	23	24.82	16.0	32.8
Free msg. no noise	18	6	14.6	12	23	46.40	28.6	51.4

A. General Descriptions of Behavior

Before answering the three research questions raised in the previous session, a general description of subject behavior is provided to give readers a broad view of subject decisions

in each of the treatments. The first two columns of Table 1.4 present subject cooperation rate in the first round of the first match and in all rounds of the first match in each treatment. Column 3 and 4 present subject cooperation rate in all the first rounds of all matches and in all rounds of all the matches in each treatment. Subject cooperation rate is defined as the percentage of the number of subjects who choose to cooperate over the number of all subjects in a treatment. It is noticeable that subjects started the game with higher levels of cooperation in all treatments. The cooperation rate decreased over time in all treatments except in the treatments with free messages, regardless of the noise level. The Free-message without noise treatment had the highest subject cooperation rate overall. The Fixed-message treatment had the lowest cooperation rate both in the very first round of the game and in all rounds of the game.

Figure 1.2 shows subject's initial cooperation rate at the beginning of all the matches. We can observe that in the Free-message treatment, more than half of the subjects started the game with cooperation. This is about the same for subjects in the No-message treatment. In general, subjects tended to be less cooperative in later matches as the game continued. In the Fixed-message treatment, 40% of the subjects cooperated at the very beginning of the game, and the cooperation rate fluctuated as the experiment continued. In the last match, subjects started the game with a cooperation rate of 36% in both of the No-message and Fixed-message treatments, compare to 70% in the Free-message treatment.

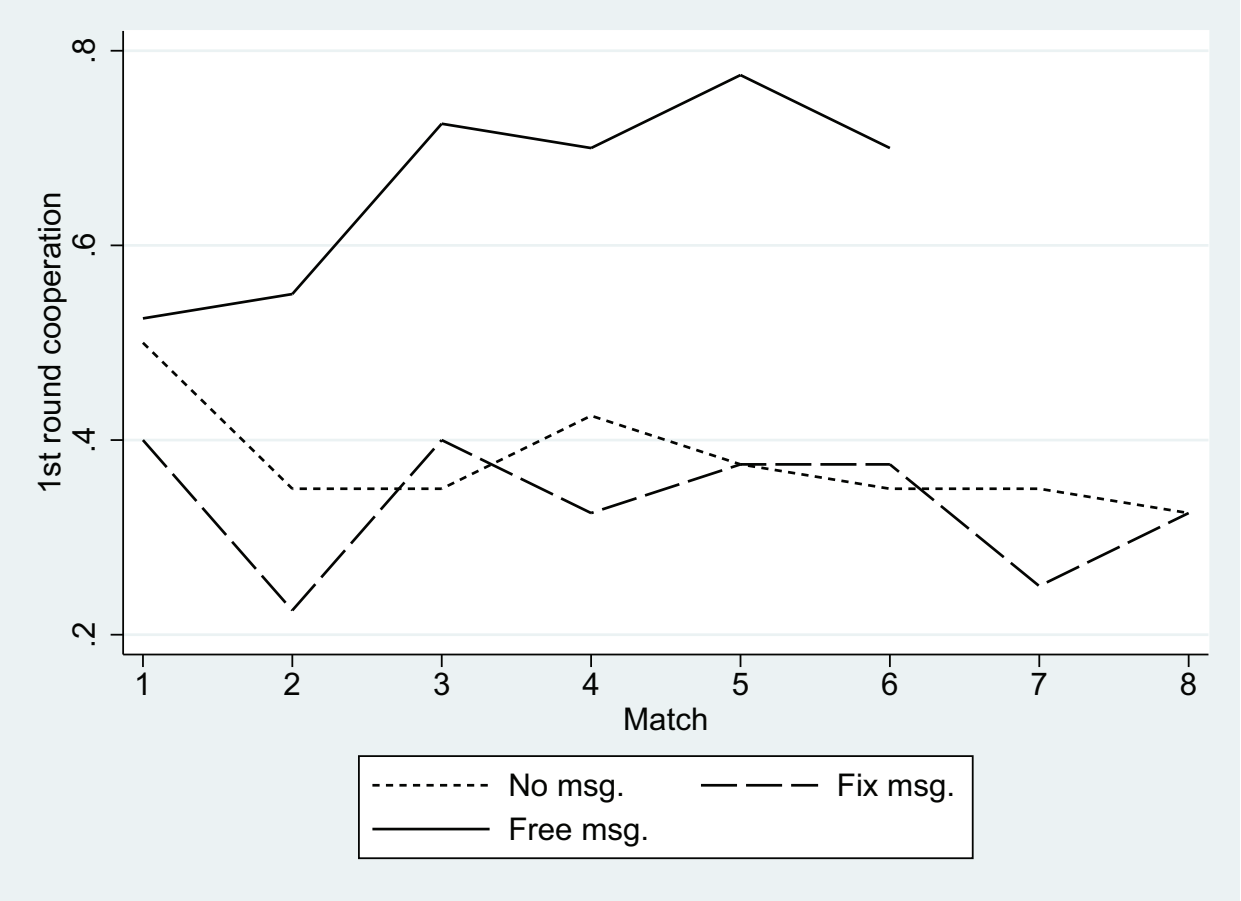
Figure 1.3 shows subject cooperation rate in the eighth rounds of all matches. In the Free-message treatment, the cooperation rate remained at a higher level, and it increased as the experiment continued. In the No-message and Free-message treatments, subject cooperation rates fluctuated from 17% to 40%.

Figure 1.4, Figure 1.5, and Figure 1.6 provide more details on subject cooperation rate in the No-message, Fixed-message, and Free-message treatments. Each match in these treatments were divided into two phases. The first phase contains the first 8 rounds, and the second phase contains the rest of the rounds of the match. The eighth round is used

Table 1.4: Subject cooperation rate in all treatments

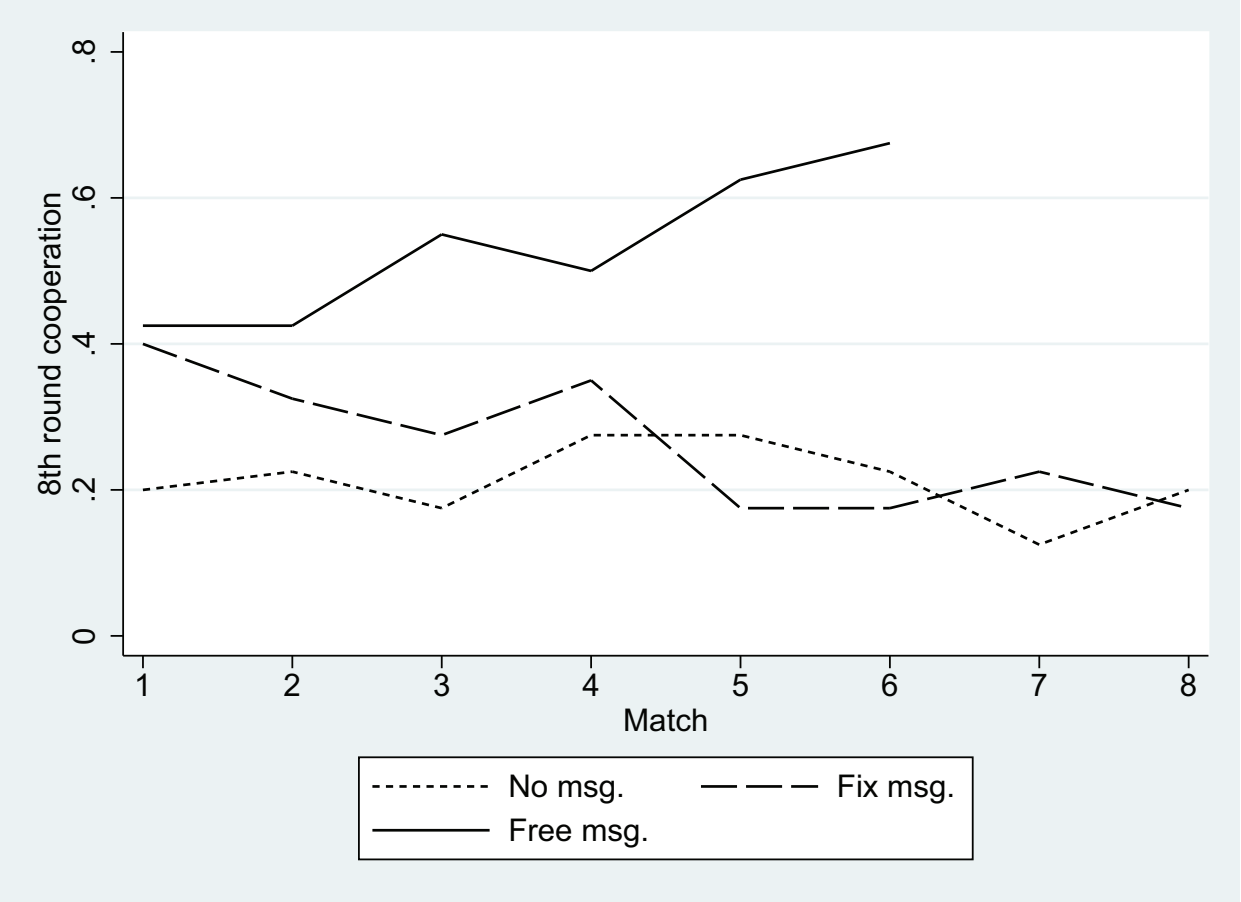
	First match		All matches	
	First round	All rounds	First round	All rounds
No msg.	50.0	29.0	37.8	24.6
Fixed msg.	40.0	30.7	33.4	24.5
Free msg.	52.5	46.3	66.3	55.6
No msg. no noise	55.0	20.3	55	36.8
Free msg. no noise	72.2	74.1	82.2	81.9

Figure 1.2: 1st round cooperation rate by treatment



as the threshold because subjects expected at least eight rounds in one match. After the eighth round, the match may end at any time. Although this random termination rule prevents end-game defections and encourages cooperating "under the shadow of the future" (Bó 2005), results from the Wilcoxon rank-sum tests show that subject are less cooperative

Figure 1.3: 8th round cooperation rate by treatment



in the second phase in all treatments with noise. These results are significant at the 1% level.

B. Are individuals less or more cooperative in a noisy environment?

Compare to in the environment without noise, subjects are less cooperative in the environment with noise. The average cooperation rate in the No-message without noise treatment is 36.8%, and this is significantly higher compared to 24.6% in the No-message with noise treatment at 1% significance level. The average cooperation rate in the Free-message without noise treatment is 81.9%, and this is significantly higher compared to 55.6% in the Free-message with noise treatment at 1% significance level as well.

Figure 1.4: Subject cooperation rate in the No-message treatment

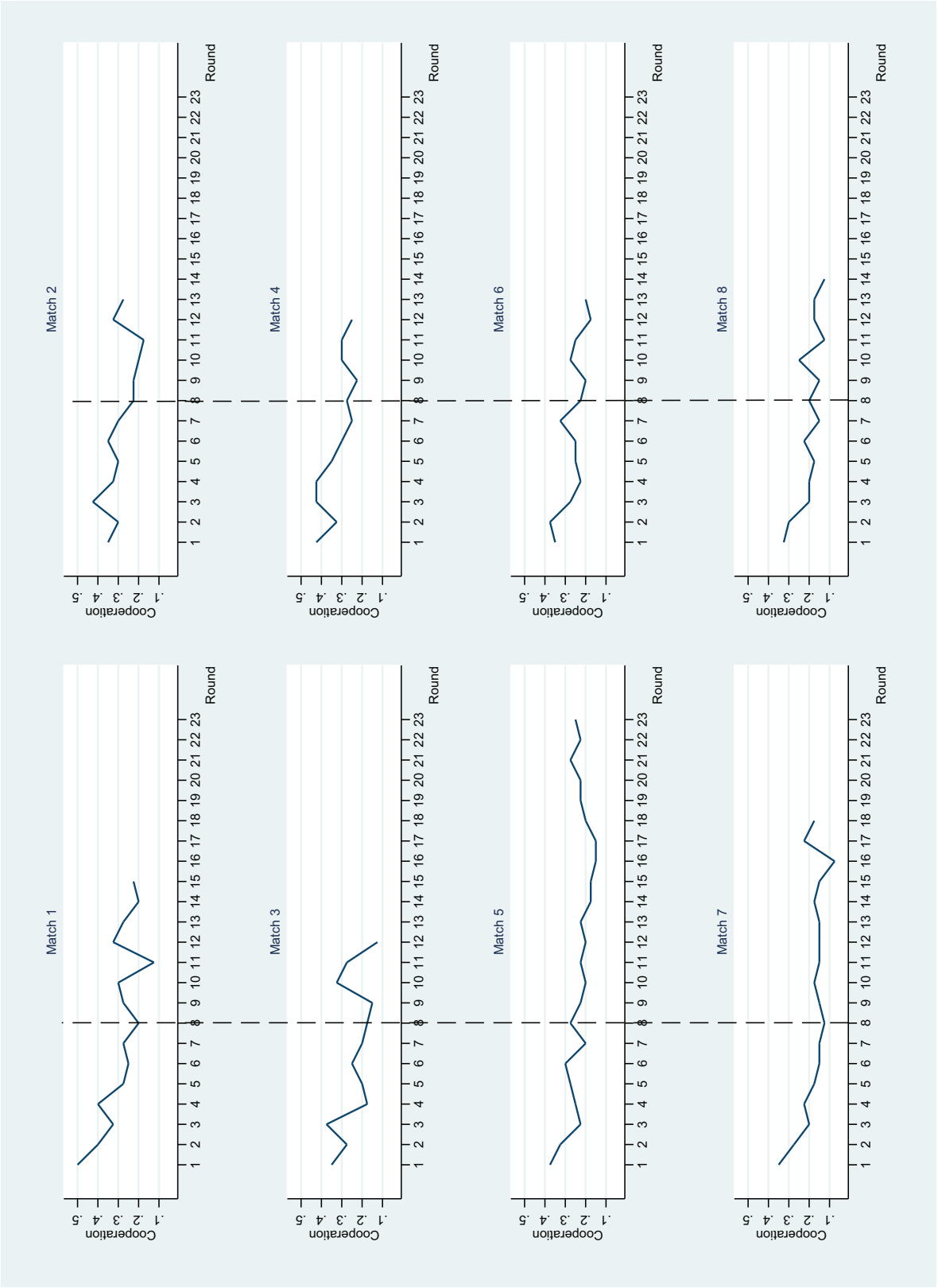


Figure 1.5: Subject cooperation rate in the Fixed-message treatment

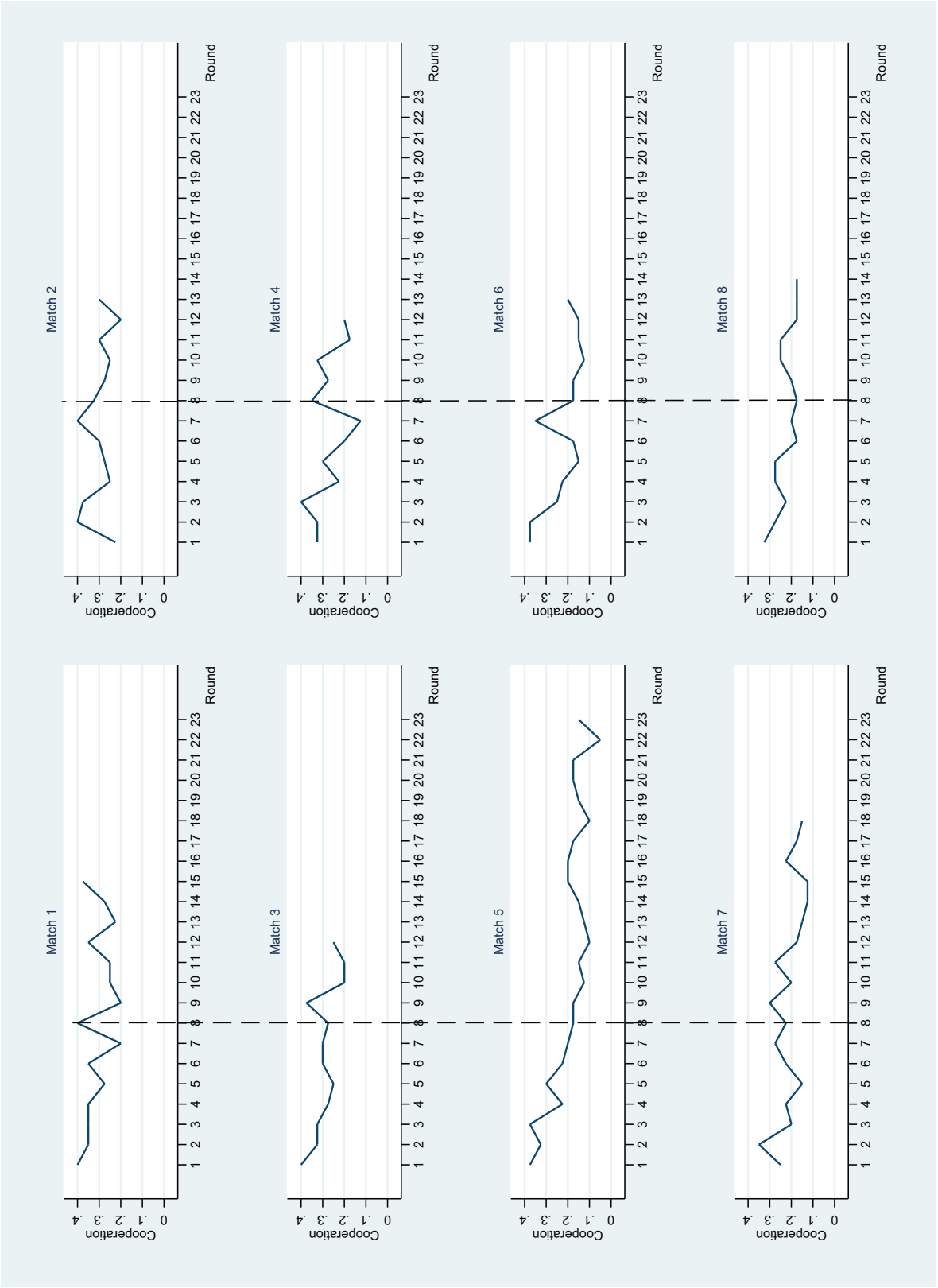
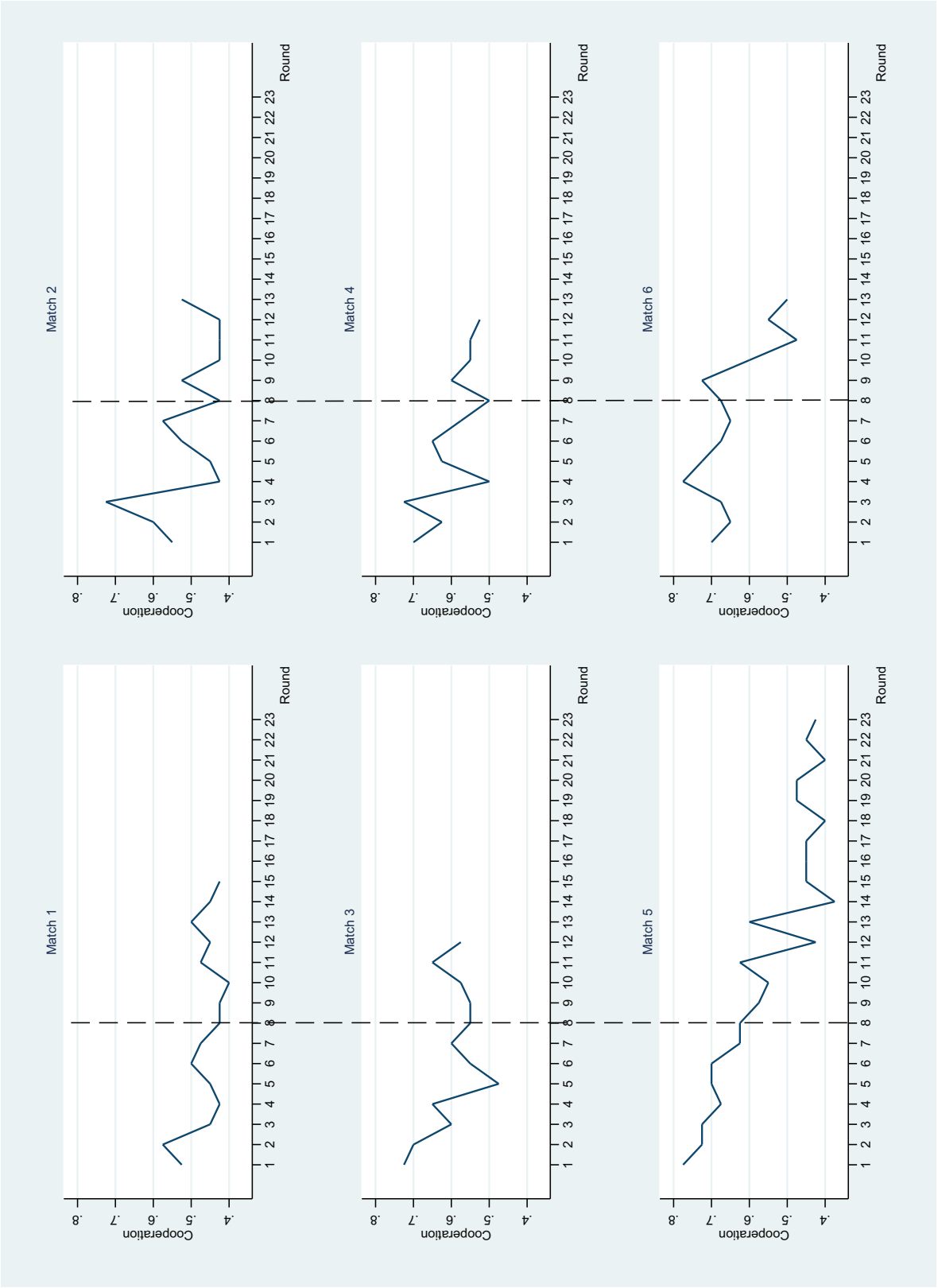


Figure 1.6: Subject cooperation rate in the Free-message treatment



Results from a probit regression also confirm that subjects are less cooperative in the environment with noise. I use the probit regression to include subject choice as dependent variable, and treatments and subject characteristics as independent variables. The baseline is the No-message with noise treatment. Results show that compared to the baseline treatment, subjects are 10.2% more likely to cooperate in the No-message without noise treatment, and this marginal increase is statistically significant at the 1% level. These results are shown in row 3 of Table 1.5.

One explanation of why subjects are less cooperative in the noisy environment is because individuals are more lenient towards defections in such an environment, compared to in the environment without noise. Subjects do not immediately punish the other party when they observe a defection in the previous round. Also, people are more likely to return to cooperation once they observe the other party has cooperated in the previous round. These phenomena are describes as "slow to anger, fast to forgive" in Fudenberg et al. 2012. In other words, the noisy environment creates a benefit of doubt. Therefore, subjects are more likely to defect in the noisy environment, taking the benefit of doubt to maximize their private gains.

C. Does communication promote cooperation?

This research finds that only free communication has a positive impact on cooperation. Subjects in the Free-message treatment cooperate significantly more compared to subjects in the No-message treatment ($p = 0.000$) and Fixed -message treatment ($p = 0.000$). However, subjects in the Fixed-message treatment do not cooperate more than subjects in the No-message treatment ($p = 0.679$).

Table 1.5 shows that with free communication, subjects are 32.2% more likely to cooperate compared to the baseline treatment where communication is not allowed. This treatment effect is statistically significant at the 1% level. On the other hand, in the Fixed-message treatment where subjects can communicate about their intentions and future moves, people are only 1% more likely to cooperate compared to subjects in the No-message treatment,

Table 1.5: Probit regression with subject choice as dependent variable

VARIABLES	(1) Choice	(2) Marginal Effect
Fixed msg.	0.0312	0.00990
	(0.0288)	(0.00914)
Free msg.	0.861***	0.322***
	(0.0298)	(0.0106)
No msg. no noise	0.296***	0.102***
	(0.0327)	(0.0114)
Free msg. no noise	1.569***	0.564***
	(0.0440)	(0.0124)
Male	0.110***	0.0368***
	(0.0238)	(0.00798)
Age	0.00708**	0.00238**
	(0.00349)	(0.00117)
Econ	0.0985*	0.0221*
	(0.0535)	(0.0180)
Constant	-0.921***	.
	(0.0797)	.
Observations	18,024	18,024

Baseline: No-message with noise treatment.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

and this is statistically insignificant. Therefore, sending and receiving fixed messages do not significantly influence subject decisions on coopertation. These results are in line with Cooper and Kuhn 2010, where the authors found that communication in limited message space provided no credible threats to enforce coordination.

Communication has two roles in this experiment: (1) providing information on subject intentions and future moves, and (2) creating relationships between individuals and reducing social distance. The first role can be obtained by sending and receiving either fixed messages or free messages. The second role is better realized by exchanging free messages. Compare to communicating via short and aloof fixed messages, free chat gives subjects the chance to greet and acknowledge each other, and this helps building trust and trustworthiness between subjects. Communication in both the Fixed-message and Free-message treatments is cheap-talks per se, since there is no cost for sending or receiving messages, neither is there any enforcement or punishment associated with the contents of communication. Results of this paper show that communication is a cost-efficient way to promote cooperation between individuals.

Although messages exchanged in the Fixed-message treatment and the Free-message treatment deliver the same information on subjects' intentions and future moves, communication is essentially different in these two treatments in terms of reducing the social distance between subjects. Those predetermined messages in the Fixed-message treatment are sufficient in delivering information; however, these short and straightforward messages are less likely to immediately reduce the social distance between strangers as free chatting does. It is not only the information delivered, but also the social distance that enhances cooperation between individuals. Comparison between the No-message no noise treatment and the Free-message no noise treatment also reveals the same strong treatment effect of free communication. When subjects can communicate freely, they cooperate significantly more. Besides, it will be interesting to analyze subject chatting histories in the Free-message treatment. Conversation histories can be coded and matched with subject intentions and

realized outcomes, which allows us to determine the impact of any inconsistency between what subjects has claimed in sent messages and the real outcomes.

Results show that other factors such as subject characteristics also influence subject decisions (see Table 1.5). Older male students are slightly more cooperative. This finding is different from Gneezy et al. 2003, Croson and Gneezy 2009, and Niederle and Vesterlund 2005, where the authors state that females cooperate more often compared to male participants; however, this finding is in accordance with Price 2010. It is also found that economic-major undergraduates are 2.21% more likely to cooperate compared to non-economic majors, but this is based on a very small sample size of economic-major students.

D. Do subjects learn to cooperate over time?

This experiment design allows us to explore if subjects learn to cooperate over time. A fixed-effect model is adopted to test whether previous partner's decision at the beginning of the match affects subject's own decision of the current match, both controlling for individual fixed-effect and time fixed-effect. Results show that if the other party has cooperated in the first round of the previous match, then subjects are more likely to cooperate at the beginning of the current match. In other words, cooperation is transmissible between subjects. A cooperative individual has a positive influence on the people he or she has interacted with. Since individuals learn and update their information about the subject pool during the experiment, a cooperative subject is likely to influence others and make the entire subject pool more cooperative. Table 1.6 shows that learning is significant for all the treatments with noise, especially in the Free-message treatment.

Besides learning over matches, subjects also adjust their decisions within a match according to the realized outcomes in previous rounds and the communication factors. For the No-message treatment, the following model was constructed to test subject learning within a match:

$$Y_{ivt} = \alpha + \beta_1 Y_{-iv(t-1)} + \beta_2 Y_{-iv(t-2)} + \beta_3 Y_{-iv(t-1)} Y_{-iv(t-2)} + \epsilon_{ivt} \tag{1.1}$$

Table 1.6: Previous partner's decision on subject's own decision

VARIABLES	Subject choice in the 1^{st} round of the current match		
	(1) No msg.	(2) Fixed msg.	(3) Free msg.
Partner's choice in			
the 1^{st} round of the previous match	0.335***	0.450***	1.079***
	(0.103)	(0.168)	(0.324)
Constant	-0.711***	-0.904***	0.121
	(0.219)	(0.260)	(0.199)
Observations	280	280	200

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Y_{ivt} is a binary variable that denotes subject i's choice in the t^{th} round of the v^{th} match. $Y_{ivt} = 1$ if subject chooses to cooperate, and $Y_{ivt} = 0$ if subject chooses to defect. $Y_{-iv(t-1)}$ and $Y_{-iv(t-2)}$ denote subject i's partner's realized choices in the $(t-1)^{th}$ and $(t-2)^{th}$ rounds of the v^{th} match. $Y_{-iv(t-1)}Y_{-iv(t-2)}$ is the interaction term. ϵ_{ivt} is the error term. There is no communication in this treatment.

For the Fixed-message treatment, Model (1.1) is modified as follows:

$$Y_{ivt} = \alpha + \beta_1 Y_{-iv(t-1)} + \beta_2 Y_{-iv(t-2)} + \beta_3 Y_{-iv(t-1)} Y_{-iv(t-2)} + \beta_4 message_{ivt} + \beta_5 partnermessage_{ivt} + \epsilon_{ivt} \tag{1.2}$$

Compare to Model (1.1), Model (1.2) contains two communication factors, $message_{ivt}$ and $partnermessage_{ivt}$. $message_{ivt}$ denotes subject i's message sent in the t^{th} round of the v^{th} match, and $partnermessage_{ivt}$ denotes subject i's message received from his or her partner in the t^{th} round of the v^{th} match. Both $message_{ivt}$ and $partnermessage_{ivt}$ are dummy variables which equal to 1 if the cooperative message " I will choose A" is sent or received, and equal to 0 if the non-cooperative message " I will choose B" is selected.

In the Free-message treatment, a communication variable *communication* is added to the baseline Model (1.1):

$$Y_{ivt} = \alpha + \beta_1 Y_{-iv(t-1)} + \beta_2 Y_{-iv(t-2)} + \beta_3 Y_{-iv(t-1)} Y_{-iv(t-2)} + \beta_4 communication_v + \epsilon_{ivt} \quad (1.3)$$

where $communication_v = 1$ if subject i has sent at least one messages and also has received at least one message in the first three rounds of the v^{th} match; otherwise, $communication_v$ =0.

Results from Table 1.7 show that in the No-message treatment, subject decision in the current round is affected by partner's realized choice in the previous round. For example, if a subject observes that his partner has defected in the previous round, he is more likely to respond with defection in the current round, regardless of partner's intended choice in the previous round. Table 1.8 shows that in the Fixed-message treatment, partner's realized choices in the previous two rounds, message sent in the current round, and message received in the current round all influence subject decision in the current round. If a subject observes that his partner has cooperated in the previous two rounds, he is more likely to respond that with cooperation. If a subject sends a cooperative message, he is more likely to act accordingly. If a subject receives a cooperative message, he is more likely to respond with cooperation as well. In the Free-message treatment, a subject considers both the partner's realized choice in the previous round and communication when making a decision for the current round. Outcomes in round $t-2$ no longer effect subject decision in round t. If a group has communicated at the beginning of the match, they tend to cooperate more during the match.

In sum, subjects do not recall outcomes in more than one previous rounds when making their decisions in the current round when communications is allowed. Communication increases the likelihood of cooperation.

Table 1.7: Subject choice in the No-message Treatment

VARIABLES	subject choice in round t	
	(1)	(2)
partner's realized choice in round $(t-1)$	0.411***	0.532***
	(0.131)	(0.130)
partner's realized choice in round $(t-2)$		0.168
		(0.203)
interaction term		1.937***
		(0.231)
Constant	-1.274***	-1.733***
	(0.189)	(0.165)
Observations	4,480	4,160

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.8: Subject choice in the Fixed-message Treatment

VARIABLES	subject choice in round t			
	(1)	(2)	(3)	(4)
partner's realized choice in round $(t-1)$	0.393***	0.437**	0.409***	0.475**
	(0.135)	(0.213)	(0.132)	(0.226)
partner's realized choice in round $(t-2)$			0.248**	0.404***
			(0.123)	(0.156)
message sent in round t		2.041***		1.880***
		(0.314)		(0.320)
message received in round t		0.779***		0.522*
		(0.296)		(0.305)
interaction term			1.434***	1.259***
			(0.206)	(0.153)
Constant	-1.261***	-2.463***	-1.613***	-2.614***
	(0.151)	(0.335)	(0.148)	(0.335)
Observations	4,480	1,596	4,160	1,454

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.9: Subject choice in the Free-message Treatment

VVARIABLES	subject choice in round t			
	(1)	(2)	(3)	(4)
partner's realized choice in round $(t-1)$	0.448***	0.412***	0.386***	0.366***
	(0.104)	(0.101)	(0.109)	(0.106)
partner's realized choice in round $(t-2)$			0.202	0.177
			(0.136)	(0.136)
communication		1.409***		1.073***
		(0.211)		(0.204)
interaction term			1.215***	1.092***
			(0.108)	(0.112)
Constant	-0.0499	-1.279***	-0.531***	-1.421***
	(0.113)	(0.216)	(0.146)	(0.234)
Observations	3,280	3,280	3,040	3,040

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.5 Conclusion

This paper designs a laboratory experiment to examine what factors influence individual decision when there is a conflict between private interests and mutual benefits. This research studies how communication shapes individual cooperation. The experiment design of this paper includes three features of human interaction: a noisy environment, an indefinite length of interaction, and communication. Results of this research reveal that people are less cooperative in a noisy environment. Also, subjects learn to cooperate over time and adjust their decisions according to the realized outcomes. Moreover, various levels of communication affect subject decision differently. When subjects cannot communicate with each other, they are less likely to cooperate. They behave in the same way with limited communication. Only free communication significantly increases cooperation. Results of this study provide a new perspective on the role of communication in promoting economic efficiency in a noisy environment. It is not the information exchanged, but rather the free communication itself, which reduces the social distance between individuals, that promotes

and retains cooperation.

Chapter 2

Double-edged Sword: A Field Experiment on Public Recognition and Individual Charitable Giving

2.1 Introduction

Charities and non-profit organizations (NPOs) play an important role in providing public goods and services in our society. In the year of 2012, all charitable and nonprofit organizations of the US received 316 billion dollars, which was about 2% of its GDP. Specifically, 71% of these total amount comes from individuals and households. Comparatively, the total amount received by all charitable and non-profit organizations in China was 13 billion dollars, which was only 0.16% of the nation's GDP, and the majority comes from corporate donations. Researchers and organizers of charities and NPOs are seeking cost-benefit efficient ways to increase individual charitable giving. Various approaches have been adopted to attract more donors (increasing the extensive margin) and elicit more donations (increasing the intensive margin), such as recognizing donors through social medias.

Numerous studies focus on the motivations behind individual charitable giving. Accord-

ing to Ariely et al. 2009 and Soetevent 2011, people donate to charitable and non-profit organizations because of (1) the intrinsic motivation, such as pure altruism and inequality aversion, as people care for others' well-being, (2) the extrinsic motivation, which refers to the material rewards people receive from giving, and (3) the image motivation, or reputation motivation, which implies that people care about their images perceived by others and themselves. Extensive works have been done on examining the image motivation. Becker 1974 claims that an individual may donate more desiring to improve his reputation. Glazer and Konrad 1996 state that an individual may use his donation as a signal of his generosity, wealth, or both. Therefore, people tend to donate more when their donations can be observed by the public. Harbaugh 1998 also claims that public recognition is an important reason for people to donate. Moreover, public recognition is the only channel for individuals to gain prestige through donating. Benabou and Tirole 2006 further extend the theory by analyzing the interactions of the three motivations of giving in the image signaling framework. They find that an individual's concern on his image increases with the visibility of his action. These findings have been confirmed in various laboratory and field experiments. For example, Andreoni and Petrie 2004 find that when subjects' identities and donations are revealed, their group contribution to public goods increases by 59%. In their fundraising experiment sessions, the authors find that most of their subjects choose to have their contributions recognized when they are offered the chance. Other experimental studies also show that people behave more prosocially when their identities are released to the public. For example, people are more generous in giving their time or money (Soetevent 2005, Linardi and McConnell 2011, Reinstein and Riener 2012, and Karlan and McConnell 2012). Likewise, when people behave prosocially, they prefer to be perceived as doing the good deed for the society rather than for other reasons, such as for material rewards and benefits (Ariely et al. 2009, Lacetera and Macis 2010).

In previous laboratory experiment studies (such as Andreoni and Petrie 2004, Karlan and McConnell 2012, and Reinstein and Riener 2012) and field experiment studies (such

as Soetevent 2005 and Linardi and McConnell 2011), increased public recognition is always observed with a higher level of individual giving. In these experiments, anonymity is hard to attain: either information disclosure on subjects' identities or/and donations were required regardless of their donation decisions, or it was hard to remain anonymous in a small laboratory environment when everyone else chose to be recognized, or it was impossible for subjects to hide their identities or donations when their actions were observed by others in a field experiment. Therefore, in these current studies, the underlying assumption for public recognition resulting in higher individual donation is that subjects cannot opt out from public recognition. This is a crucial assumption because if public recognition is optional, we expect people behave differently. For example, those who prefer not to be recognized, or those whose image motivation outweighs their intrinsic motivation will give less, or they will choose not to give.

This paper intends to study the full scope of the effects of public recognition and information disclosure on individual charitable giving. Particularly, we are interested in the research question of what kind of institution fosters individual giving in China. According to a comparative study on nonprofit sectors across nations conducted by the John Hopkins Center for Civil Society Studies Center 2004, higher tax rates and better social benefit programs are negatively related to the rate of individual giving in developed countries. In European countries with better social benefit programs, although their individual donations were lower compared to that of the United States, people were more interested in other forms of giving such as volunteering. China, as a developing country that has been experiencing major social transformations in recent decades, encouraging charitable giving and promoting individual donation become more and more important nowadays. Also, this paper aims to add to a small number of literature studying individual donation on east Asian countries. The unique oriental culture may shape individuals' attitudes towards donating and public recognition, which leads to distinct results obtained with subjects in the western world. To best answer our research question, we conducted a field experiment at Zhejiang University in

China. Subjects were randomly recruited and assigned into one of the five treatments with distinct information disclosure schemes. We find that public recognition affects individual giving in two opposite ways. On the one hand, subjects donate significantly more when they realize that they will be publicly recognized. On the other hand, public recognition lowers participation rate when subjects can avoid it by not donating. Approximately 1/3 of our subjects in those treatments with optional public recognition chose not to give and not being recognized. In another treatment where subjects were offered the chance to be publicly recognized after they donated, only 18% of them accepted this offer. 82% of the subjects chose not to be recognized, especially those whose donations were relatively small. In sum, public recognition is a "double-edged sword" towards individual charitable giving. This result provides practical values and policy implications for charities and NPOs.

The rest of this paper proceeds as follows. Section 2 describes the experimental design. Section 3 provides the results. Section 4 concludes.

2.2 Experiment Design

We conducted a field experiment at Zhejiang University of China in November 2013 and March 2014. This experiment was part of a fundraising event associated with the China Foundation for Poverty Alleviation (CFPA)[1], aiming to support elementary and middles schools in rural areas of China. All our appliances used for this experiment, such as posters, donation boxes, subject information cards, etc. carried the official logo of CFPA.

We choose to conduct this study as a field experiment in China for several reasons. First, since this research aims to help promoting individual donations and provide practical insights for charitable organizations in China, obtaining subjects' data from the field is a better way pf learning and understanding individual behaviors in real lives. Second,

[1]China Foundation for Poverty Alleviation, founded in March 1989, is the largest and most influential non-profit organization specializing in poverty alleviation in China. For more details, please visit its official website: http://www.fupin.org.cn.

comparing to a laboratory experiment setting, a field experiment provides a larger environment where subject anonymity is possible. Moreover, China provides a unique background for conducting this field experiment, since mandatory public recognition is widely used for fundraising in schools, government and public sectors.

In this field experiment, we constructed an endowment earning stage and a donation eliciting stage. In the endowment earning stage, subjects were randomly recruited to complete a survey on their career plans. We also asked for personal information in this survey, such as subject's age, gender, major, family income, number of siblings, etc., but we did no ask any question relating to charity giving. It took a typical subject about 5 minutes to finish this survey, and each subject was paid 30 yuan [2] in cash upon completion. In the donation eliciting stage, subjects were introduced to the CFPA fundraising program and were offered an opportunity to contribute. We separated the survey site and the fundraising site far away from each other. Subjects did not know these two stages were related, and neither did they know that they were participating in an experiment. Subjects were able to donate in private in a divided donation area. We also provided envelopes and used non-transparent donation boxes, in order to protect subject privacy if they preferred to be anonymous donors.

We enrolled 12 experimenters and trained them before the experiment. We divided them into 3 teams, and each team had a recruiter, a surveyor, a cashier, and a fund solicitor. Their duties were clearly divided: the recruiter was responsible for randomly recruiting subjects. The surveyor was responsible for answering any question a subject might have during the survey period. The cashier was responsible for handling subject payments. The fund solicitor was responsible for introducing the fundraising program to subjects. To best eliminate the experimenter's effect on subjects (List and Price 2009), we selected experimenters with similar age and sex for the same role. Each team recruited a balanced number of subjects for each treatment. We assigned 5 subjects successively into one treatment before switching to another.

[2]The minimum hourly wage of the city was 12 yuan at that time. The purchasing power of this 30 yuan was approximately equal to three meals of a day at the university school cafeteria.

We gave subjects envelopes to put their cash donations. These envelopes were numbered on the inside, allowing us to tie donations to subjects' characteristics that we gathered from the surveys. We designed five treatments with distinct public recognition schemes and varied the timing when we offered chances of public recognition. Treatment 1 was the Donation-only Treatment ($-only). Before donating, subjects were told that only their donations would be released to the public. Their names would not be released. Treatment 2 was the Name-only Treatment (Name-only). Before donating, subjects were told that they would be publicly recognized if they donate. Only their names would appear but not their donations. Subjects were offered blank cards to write their names. If a subject did not wish to be recognized, he could donate zero and leave the card blank. Treatment 3 was the Public Recognition with Opt-in Treatment (PR-in). Subjects in this treatment first made their donations without knowing that they would be recognized. After donating, subjects were provided the chance of public recognition. If a subject would like to be recognized, he or she needed to write both name and donation amount on the card provide. Otherwise, the subject only needed to write down the donation amount. It is noteworthy that although subjects were provided the chance of public recognition after donation, they were not able to make any changes in their donation. Treatment 4 was the Public Recognition with Opt-out Treatment (PR-out). Subjects in this treatment were notified before making their donations that they would be publicly recognized if they donate. If they chose to donate, they needed to write their names on the cards provided. Otherwise, they could donate zero and leave the card blank. Subjects in the PR-out treatment expected public recognition if they donated. The only way to opt out from public recognition was not donating. Compare to that, subjects in the PR-in treatment were anonymous donors when they donated. They could opt in for public recognition after they donated. Treatment 5 was the Mandatory Public Recognition Treatment (Mandatory-PR). In this treatment, regardless of how much subjects donate (including zero), their names and donations would be released to the public. Table 2.1 summarizes these five treatments.

Table 2.1: Treatments

Treatment	Information Released	Public Recognition
$-only	Donation only	Not available
Name-only	Name only	Optional, offered before donation
PR-in	Both donation and name	Optional, offered after donation
PR-out	Both donation and name	Optional, offered before donation
Mandatory PR	Both donation and name	Mandatory, offered before donation

We can analyze treatment effects by comparing between treatments using the difference-in-difference approach. First, if we compare the PR-out Treatment and the Name-only Treatment, we can obtain the treatment effect on releasing subject donation amount to public. Likewise, if we compare the PR-out Treatment and the Donation-only ($-only) Treatment, we can get the treatment effect on releasing subject names to public. Our assumption is that since subjects are driven by their reputation motivation, releasing subject names will increase donation, while only releasing subject donation amount will have no effect on donation. By comparing the Donation-only Treatment and PR-in Treatment, we are able to analyze the post-donation public recognition information such as who would opt-in for recognition and their donation amount. Also, we can examine the effect of public recognition on individual donation by comparing across treatments. In the Donation-only and PR-in Treatments, subject are anonymous donors at the moment of donation, while in the Name-only and PR-out Treatments, subjects know that they will be recognized at the moment of donation. By analyzing subject donation amount and participation rate, we are able to investigate the how public recognition influences individual donation behavior.

We used the Zhejiang University Bulletin Board System, the 98 Forum, as a platform to recognize our donors. The 98 Forum is the university official and the most popular campus-wide social network among students, faculty, and staff at the Zhejiang University[3]. All of our subjects knew about the 98 Forum, and most of them were registered members. In those treatments where public recognition was available, subjects were informed that their names, or donations, or both would be published on 98 Forum in the following month after

[3]As of May 12, 2014, this forum has 199,328 registered members.

donation.

2.3 Results

We obtained 262 observations from this field experiment. Table 2.2 provides some summary statistics. In this table, it shows that the Mandatory PR treatment has the highest average donation of 17.35 yuan. This number is significantly higher compared to those in other treatments[4]. The average donations in the rest of the treatments are not statistically different from each other[5]. Also, the Mandatory PR treatment has the highest participation rate of 93.02%, and the highest average donation from contributed subjects of 18.65 yuan.

These results indicate that people are highly influenced by their reputation concern when donating. This finding leads to our first result that public recognition leads to higher participation rate and larger donation. It is consistent with what was found in previous researches, where public recognition significantly increases individual donations when it is mandatory.

Result 1. Public recognition encourages individual donation, especially when information disclosure is mandatory.

We divide these five treatments into two categories according to subjects' status when making donations. In the $-only and PR-in treatments, subjects were anonymous donors because public recognition either was unavailable, or was offered after subjects donated. In the other three treatments, subjects knew that they would be recognized before they donated. This difference in subject's status leads to some interesting results. Figure 2.1 shows the

[4]The average donation of the Mandatory PR treatment is higher than the $-only, Name-only, PR-in, and PR-out treatment with p-values of $p < 0.0021$, $p < 0.0020$, $p < 0.0001$, and $p < 0.0068$, respectively. All reported p-values in this section are based on the two-tailed Mann-Whitney-Wilcoxon test.

[5]The average donation of the $-only treatment is not statistically different compared to the Name-only, PR-in and PR-out treatment, with $p < 0.8540$, $p < 0.9845$, and $p < 0.8445$, respectively. The average donation of the Name-only treatment is not statistically different compared to the PR-in and PR-out treatments, with $p < 0.8299$ and $p < 0.9674$, respectively. The average donation of the PR-in treatment is not statistically different compared to the PR-out treatment, with $p < 0.8085$.

Table 2.2: Summary statistics

Treatment	$-only	Name-only	PR-in	PR-out	Mandatory PR
# of subjects	43	49	78	49	43
Avg. donation	11.05	11.22	10.88	11.63	17.35
	(10.03)	(11.62)	(10.20)	(11.83)	(9.91)
# of contributed subjects	35	34	66	32	40
Participation rate	81.40%	69.36%	84.62%	65.31%	93.02%
Avg. donation of contributed subjects	13.75	16.18	12.86	17.81	18.65
	(9.44)	(10.66)	(9.87)	(10.16)	(8.99)
# of recognized subjects	-	34	12	32	41

Donations are in Chinese yuan (CNY). The numbers in parenthesis are standard deviations.

average donation of contributed subjects and the participation rate for all the treatments as two categories. First, for those subjects who contributed, their average donations are higher in those treatments where public recognition is offered before donation.[6] Second, Within each category, there is no statistical difference between the average donations of contributed subjects.[7]

Figure 2.1 also show the subject participation rate in each treatment.[8] It shows that only 69.36% and 65.31% of subjects contributed in the Name-only and PR-out treatments, respectively. These participation rates are relatively low compared to those in the other category. To further analyze the relationship between subject particiaption decision and the choice of public recognition, we run a probit regression with donation decision as the dependent variable on various explanatory variables. The results are described in Table 2.3.

We find that subjects are 18.84% less likely to donate in the Name-only treatment

[6]The average donation of those contributed subjects in the $-only treatment is statistically lower compared to those in the Name-only treatment ($p < 0.1985$), PR-out treatment ($p < 0.0600$), and Mandatory PR treatment ($p < 0.0082$). The average donation of those contributed subjects in the PR-in treatment is statistically lower compared to those in the Name-only treatment ($p < 0.0619$), PR-out treatment ($p < 0.0123$), and Mandatory PR treatment ($p < 0.0004$) as well.

[7]The average donation of contributed subjects are not statistically different between the Name-only and PR-out treatments ($p < 0.4281$), the Name-only and Mandatory PR treatments ($p < 0.1220$), as well as the PR-out and PR treatments ($p < 0.5890$). The average donation of contributed subjects in the $-only treatment is not statistically different from that of the PR-in treatment ($p < 0.6708$).

[8]Subject participation rate = number of contributed subjects / number of total subjects of the treatment.

Figure 2.1: Average donation of contributed subjects and participation rate in each treatment by category

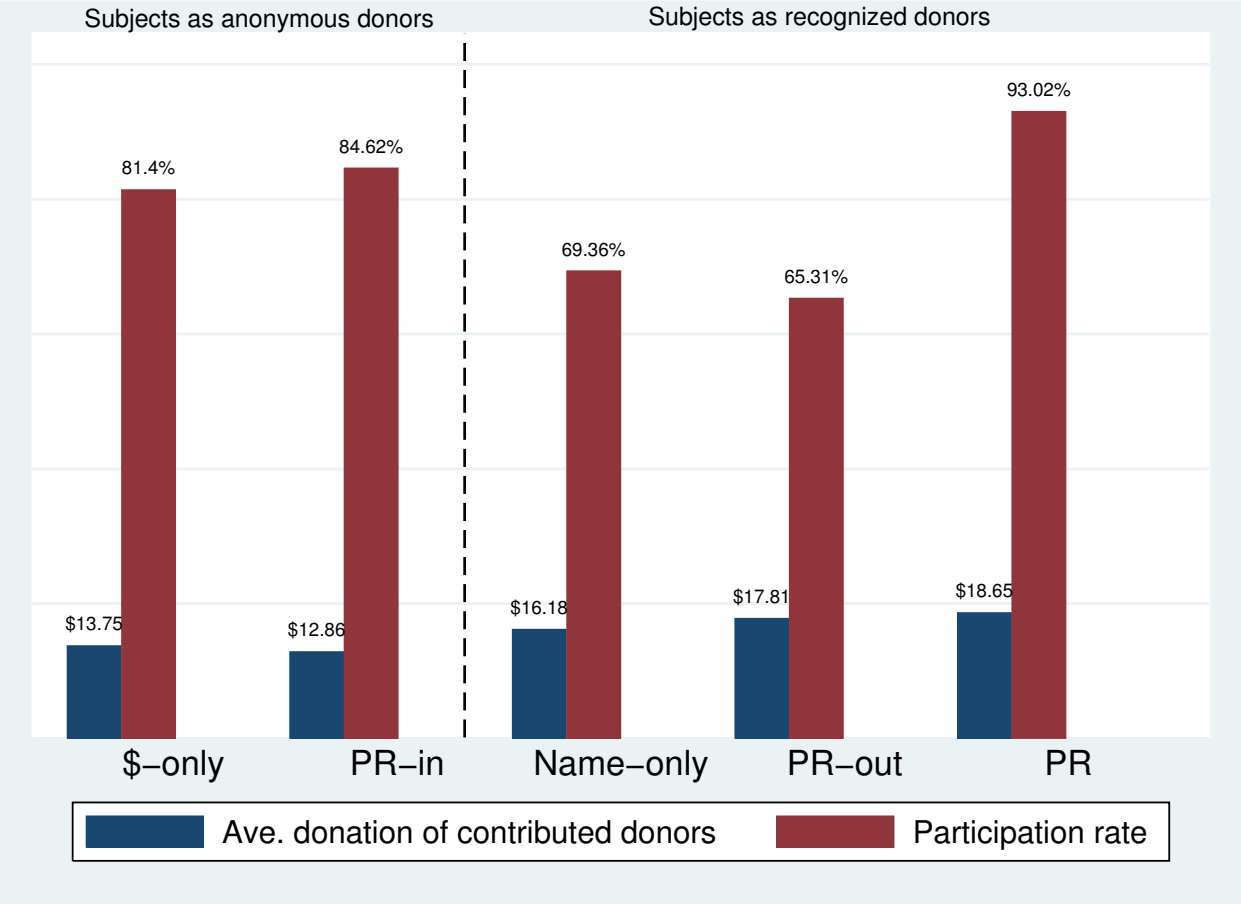


Table 2.3: Probit regression of donation dummy on explanatory variables

Sample:		Full	
Mean of Dep. Var. for Omitted Treatment:		0.7901	
		(1)	
Independent variables	Marginal effect	Coefficient	s.d.
Treatment			
$-only	0.0300	-0.1079	(0.2945)
Name-only	-0.1884**	-0.6766**	(0.2847)
PR-out	-0.1355***	-0.4867***	(0.2678)
Mandatory PR	0.1217	0.4369	(0.3263)
Session time		X	
Subject characteristics		X	
# of observations		253	
Pseudo R^2		0.0852	
p-value		0.0184	
Wald χ^2		24.32	

*We use PR-in treatment as the baseline. We use weighted sample regression since there are more observations in the PR-in treatment. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.*

compared to the PR-in treatment, and this result is significant at 5% level. Also, subjects are 13.55% less likely to donate in the PR-out treatment compared to the PR-in treatment, and this result is significant at 1% level. This implies that subject participation is affected by their donation status. If subjects know that they will be recognized before donation, some of them would rather not donate in order to opt out from public recognition. In other words, subject participation rate is lower in those treatments where regocnition is offered before donation and optional, since subjects who prefer to be anonymous opt out. Furthermore, result of the Fisher's exact test shows that subject participation rate in the Name-only treatment is not statistically different from that in the PR-out treatment.[9] This implies that subject participation is affected by information disclosure on identity rather than donation. These findings lead to our second result.

Result 2. Public recognition discourages individual participation in charitable giving,

[9]Fisher's exact=0.830.

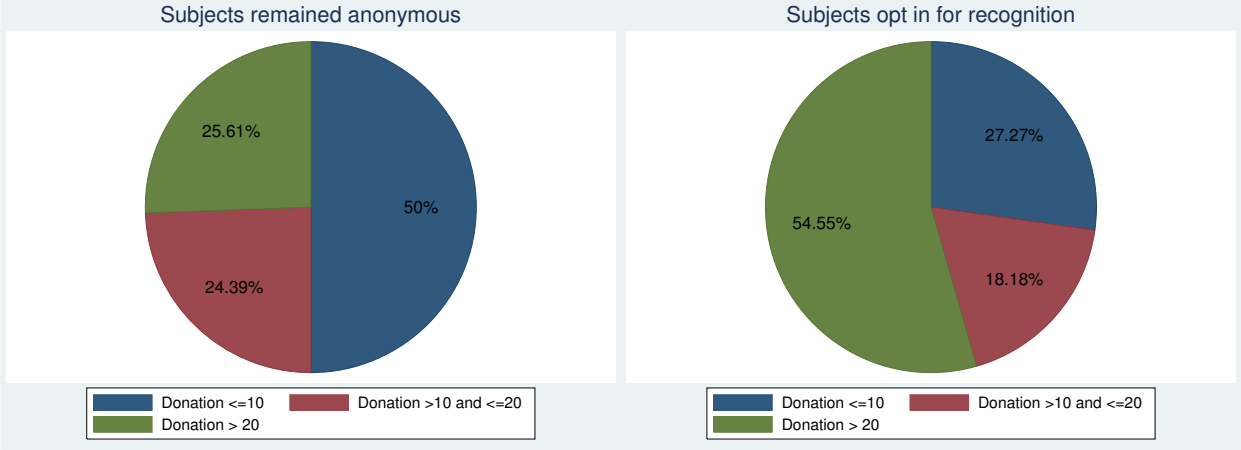
especially when individuals can opt out from identity disclosure by not donating.

As opposed to previous researches where public recognition is found to increase donation unanimously, we reveal that public recognition crowds out potential donors who prefer to be anonymous. Compare to previous findings such as in Andreoni and Petrie 2004 where most subjects opt in for public recognition, we observed that the majority of donors preferred to stay anonymous. We recruited 78 subjects in the PR-in treatment in order to get more observations on recognized subjects in this treatment. However, only 12 out of 66 contributed subjects opt in for public recognition. About 82% of the subjects who made a donation in this treatment chose to remain anonymous.

We attempt to characterize those donors who stayed anonymous in the PR-in treatment and analyze the reasons behind that. One possible explanation is due to the unique oriental culture on attitudes towards public recognition. Oriental culture values modesty and believes that a good deed done anonymously deserves to be praised twice. Therefore, subjects prefers to stay anonymous in order to be perceived as caring about others and doing the good deed itself, which is superior, rather than as gaining personal reputation. More importantly, we find that the average donation was 11.43 yuan for the group of subjects who chose to remain anonymous, compared to that of 15.50 yuan of those who opt in for public recognition.[10] Figure 2.2 provides additional information on subjects' donation between anonymous donors and recognized donors in the PR-in treatment. We categorized them as Low, Medium, and High amount donors according to their donations. For those subjects who chose to remain anonymous, 70.69% donated less than 10 yuan (Low), 17.24% donate 11-20 yuan (Medium), and 12.07% donate more than 20 yuan (High). For those subjects who opt in for public recognition, these percentages were 50.00%, 16.67%, and 33.33%, respectively. One explaination of this observation is that subjects have their own believes on how much is a high or a low donation, and these home-grown believes vary by individuals. For example, five yuan may be considered as a high amount of donation for one individual while the same

[10]The sample size did not allow further economics analysis.

Figure 2.2: Donation of the PR-in treatment



amount may be considered as a low donation by another. Therefore, we observe subjects whose giving were in the low category (below 10 yuan) and still chose to be recognized, as well as subjects whose giving were in the high category (above 20 yuan) and chose not to be recognized. However, as the absolute amount of donation increases, more and more people are going to consider it as a high amount. Hence, we observed the tendency that subjects with relatively small donations were more likely to stay anonymous, while subjects with relatively higher donations were more likely to opt in for public recognition.

Since public recognition was offered after subjects donated, participants in the PR-in treatment were not motivated by their image or reputation concern when donating. However, image motivation affects subject decision on whether they choose to be publicly recognized or not. When donors are required to release their information, those who might have donated if they could remain anonymous opt out, especially for those who would have donated a small amount. One explanation of this is that people are more likely to remain anonymous if they believe their donation is not high enough to improve their reputation, if not to harm it. In general, a larger amount of donation is more socially preferred and associated with generosity, wealth, altruism, etc. However, people have their own believes on what is the socially preferred level of donation. In our experiment, we did not discover

a strong correlation between the amount of donation and the choice of public recognition. However, there was a tendency that people who donated a larger amount were more likely to opt in for public recognition. These findings lead to our third result.

Result 3. Public recognition crowds out small donations from potential donors who prefer staying anonymous.

2.4 Concluding Remarks

We conducted a field experiment in China to study the full scope of the impact of public recognition on individual charitable giving. We designed five treatments with distinct schemes of public recognition and information disclosure. We find that mandatory public recognition, in which case donor's personal information is released to public regardless of donation decision, leads to the highest contributes from donors and participation rate, comparing to all other treatments. We also find that public recognition is a "double-edged sword" on individual donation. On one hand, public recognition encourages individual donation. On the other hand, public recognition crowds out small donations and lowers the participation rate when people are able to avoid it by not donating. Results of this paper reveals the rationale behind the commonly accepted form of donation with mandatory public recognition in schools, governments and other public sectors China. It also suggests that charitable organizations should adopt public recognition if the goal is to elicit larger contributes from a single donor, but should avoid public recognition if they plan to attract more donors. These results offer some insights for charitable and non-profit organization as well as for policy makers.

Chapter 3

Linking Principal Time Use to Student Performance

3.1 Introduction

According to a national-wide report on educational effectiveness of K-12 schools, in the state of Georgia, the overall student academic achievement was 5% below the national average in year 2014. Despite recent improvements, the state still performed poorly in terms of its credibility of student proficiency scores and student college and careers readiness (Hess and Oldham 2014). Considering these facts as well as records from previous reports, improving school outcomes and transforming its public school education system have become increasingly important for the state of Georgia. In fact, Georgia has participated in the Race to the Top (R2T) program, legislated by President Obama as part of the American Recovery and Reinvestment Act (ARRA) of 2009, which goals includes encouraging educational innovation and reform, improving student achievement and school outcomes, closing educational gaps, increasing high school graduation rates, and preparing students for college and careers. As part of this R2T program, the Georgia Department of Education has lauched the state's Teacher Keys Effectiveness System (TKES), Leader Keys Effectiveness

System (LKES), and Professional Keys Effectiveness System (PKES), aiming to support school teachers, principals, and staff professional growth, with the ultimate goal of enhancing student learning. Based on these state evaluation systems, Fulton County Schools (FCS) in Georgia piloted its new teacher evaluation system in the 2010-2011 school year. In the following school year, the county introduced the rest of the new evaluation systems of LKES and PKES to its school leaders and staff. At the beginning of the 2012-2013 school year, Fulton County Schools officially adopted all the three new evaluation systems issued by the state as guidelines for its school teachers, principals, and staff.

Under this background, we conducted a principal motion study with Fulton County Schools in Fall 2012 and Spring 2013. We had a team of researchers follow 30 principals of public schools in Fulton County, Georgia, including elementary, middle, and high schools from four learning communities. We shadowed each principal for two full work days, and recorded principal activities at five-minute intervals. We logged the nature of principals' activities, locations where these activities occurred, and whom principals were interacting with at that moment. We then nested and coded principals' activities into 10 broad strands, including instructional leadership, school climate, planning and assessment, organizational management, human resources management, teacher/staff evaluation, professionalism, communication and community relations, personal, and travel, under the standards on the Leader Keys Effectiveness System rubric. We complemented these first-hand observational data with school-level student performance data from state-standardized exams of the Criterion-Referenced Competency Tests (CRCT) and End of Course Tests (ECOT). By conducting this research, we aim to understand the following questions:

1. What do principals do in a typical work day?

2. How do principals' activities vary across different learning communities and by school characteristics?

3. How does principals' time use on different activities influence student performance?

This paper contributes to the literature in a number of ways: (1) it is the first study conducted in public schools in Fulton County at Metro Atlanta, Georgia, analyzing the effect of principal time use on student performance; (2) to the best of our knowledge, this study is the first one to include principals from all levels of K-12 public schools in principal motion studies; (3) this research takes advantage of the wide geometric and demographic variations in four learning communities with distinct school characteristics. This research also contributes to a small but growing number of literatures that utilize field observational data to study how principals spend their time, and how various principal activities influence student achievements. We find that principals have multiple roles as the head leader of a school, and principals adjust their time spend on each leadership role according to their school and student characteristics. Results of this research show that principals' time spend on human resource management, teacher and staff evaluation, school planning and assessment, as well as professionalism are positively related to student performance, while principals time spend on communication and community relation , and organization management are negatively related to student outcomes. These results provide a practical guideline for Fulton County school principals and principals from other districts, as well as for higher administrative offices in order to support principals' work .

The rest of this paper proceeds as follows. The next section reviews the existing literature on principal's leadership effect on school performance and student outcomes. Section 3 describes our data collection procedure and the methodology. Section 4 presents the results. Section 5 discusses the implication and limitation of this research and concludes.

3.2 Related Literature

A large volume of previous literatures studying school impact on student performance focuses on the teacher value-added, comparing and developing the teacher value-added model, and/or uses student outcomes to evaluate teacher's contribution (Aaronson et al. 2007,

Rockoff 2004, Rothstein 2008, McCaffrey et al. 2009, Chetty et al. 2013, Jackson et al. 2014, McCaffrey et al. 2004). In contrast, school principals' influence on students has not yet been fully discovered, although it is commonly agreed that principals significantly impact student performance as well. Principals affect school and student outcomes both directly and indirectly through their influences on other factors that affect student outcomes, such as principal's interaction and impact on teacher effectiveness (Leithwood et al. 1991, and Witziers et al. 2003). For example, Coelli and Green 2012 showed that principal quality and experience affected student graduation rate and English exam scores, using data from grade 12 students of British Columbia, Canada. Dhuey and Smith 2014, using 4th to 7th grade student math and reading scores from British Columbia, Canada, also confirmed that principal quality had significant impact on student achievement. Moreover, they found that better principal-school match increased student achievement by 0.17 standard deviation. School principals affect student outcomes indirectly as well. For instance, Supovitz et al. 2009 showed that principals significantly facilitated student learning through the channel of teacher's practices, such as adding new curriculum, facilitating collaboration and communication, and doing other instructional-related works. Branch et al. 2012 found that principals influenced student performance primary through the management of teacher force. Similarly, Grissom et al. 2014 claimed that student performance was positively related with principal's time spent on school management. Besides, Leithwood et al. 1991 argued that principals impacted school culture in a wide range from school programs and policies to teacher and student behaviors. Böhlmark et al. 2012 claimed that principals were an important factor in determining school policies and working conditions, and all these commonly-accepted school policies, norms, values, and believes were essential in achieving student growth and school development.

Principals considerably impact student performance and school outcomes from multiple angles, because as the head leader, principals play various roles in school. Hallinger and Heck 1998 summarized principal's roles mainly as 1) having clear visions and missions, (2)

building and maintaining school structure and networks, (3) leading, supporting, fostering teachers and school staff, as well as managing and developing relationships with all other stakeholders, and (4) building and sustaining good school culture. Waters et al. 2003 also stated that it required multiple dimension from educational leaders to be effective. The authors conceptualized a "balanced leadership framework." They pointed out that principals needed to know "what to do, when to do, how to do, and why to do," and principals needed to possess all the necessary knowledge, skills, strategies, resources, and tools in order to be effective.

Since principal's role contains multiple aspects, it is essential to ask which one is the most influential to student performance and school outcomes. Few recent researches have attempted to disentangle principal's aggregated effect on student performance; however, it is still unclear which aspect(s) of principal's role is/are the most influential. For example, Robinson et al. 2008 concluded from a meta-analysis that principal's time spent on teacher's development had a strong effect on student outcomes, while time spent on school planning and management and instructional management had moderate effects. Grissom et al. 2012 conducted a motion study with Miami-Dade County high-school principals, and found that the overall instructional activities did not predict school effectiveness. Furthermore, in their following studies of Grissom et al. 2013 and Grissom et al. 2014, they claimed that principals' time spent on instructional leadership did not, or even predicted a negative effect on student performance. Walker et al. 2014 used data from 42 public secondary schools in Hong Kong, and found that principals's time spent on communication and network building was positively correlated to student academic achievements. May et al. 2012 used principal self-reported activity logs and paired them with 3-year longitudinal data on student outcomes. They showed that more time spent on instructional leadership had no influence on student performance across schools. However, principal's time spent on financial management and personal issues were positively related to student performance, and time spent on school planning and instructional leadership had negatively impacts. Hence, there is no

consensus on which role of the principal is most crucial in improving student performance. One possible explanation of this non-consensus is that principal's time use varies over time and across schools, and principals adjust their activities according to school characteristics, student body, and/or the day of observation. Therefore, we conducted our observations in two semesters, in order to obtain the average time use by principals. We also analyzed our observational data separately in four learning communities with various school characteristics.

3.3 Data and Methodology

3.3.1 Principal Motion Study

We conducted a principal motion study with 30 public schools in Fulton County, Georgia in fall semester 2013 and spring semester 2013. We randomly selected a total of 30 schools based on three indicators. First, we categorized all public schools in the county into four learning communities, Northwest, Northeast, Central, and South, since each learning community is geographically and demographically distinct from another. Second, we stratified all public schools in the county into quintiles by their number of discipline referrals reported in the previous school year of 2011-2012. Last, we balanced the number of elementary, middle, and high schools in our sample to include 10 schools at each level. Based on these three selection criteria, we chose a sample of 30 representing schools with a broad mix of school settings, which allowed us to define more accurately how principals in the entire county typically spend their time, as well as make valid comparisons among schools and across different learning communities. We reached out to the principals from these selected schools by emails first, and asked them if they were willing to participate in this academic research. Principals were informed in this invitation email that this research was conducted independently with the purpose of understanding how principals, as a group, use their time. They were also notified that this research was not related to any of their performance evalu-

ation. Neither would they receive any kind of reward or penalty if they chose to participate in this study or not. Principals were allowed to withdraw from this study at any moment. All 30 principals in our initial selection pool responded to our emails and voluntarily chose to participate in this study.

We adopted the same procedure as Horng et al. 2010 in obtaining our observational data. We shadowed the principals of these 30 schools for their entire work day, tracked their activities, and determined their amount of time spent on different tasks. Principals were instructed to ignore the researcher and perform as in their normal working day. Each principal was shadowed by one of our researchers for two entire school days, one in Fall 2012 and the other in Spring 2013. Principal's work day is defined as 30 minutes before students arrive and 30 minute after students are dismissed. A typical work day is usually from 6:30 a.m. to 5 p.m., which usually begins and ends about 30 minutes earlier for elementary school principals. We recorded principal activities at five-minute intervals. The protocol to record principal activities was strictly limited to what the principal was doing or was about to do at the exact moment when the second hand on the observer's watch reached the five-minute interval. Since principals shift their tasks very often, in order to make the data collection process consistent, principal activities that occurred in between the five-minute intervals were not recorded. Besides recording principal's activity tasks, our researchers were also required to log the location of the activities and the person(s) with whom principals were interacting at the moment of recording. If a principal was multi-tasking at the moment of recording, only the primary task was recorded. We referred to these information when we coded principal activities afterwards. We physically followed and shadowed these principals for most of their activities during their work days, expect if principals were addressing personal matters, or if the nature of the activity was protected by privacy law. For example, we did not participate in such meetings if a principal was talking with a teacher regarding to his or her performance or HR evaluation, or if a principal was discussing with students or parents regarding to specific issues about a student. In such cases, we waited for the

principal outside of his or her office, and logged the principal activity in the same fashion based on principal's post-meeting feedback. For coding purpose, we asked principals to provide information on the nature of those meetings without disclosing any details.

We categorized and coded principal's tasks into 10 broad categories according to the nature of the activities under the standards of the Leader Keys Effectiveness System (LKES) rubric from the Georgia Department of Education. These 10 categories include instructional leadership, school climate, planning and assessment, organizational management, human resources management, teacher/staff evaluation, professionalism, communication and community relations, personal, and travel. Appendix F explains the LKES standards and each of these categories in detail. If our researcher had a specific question about coding, the instance would be brought up to the research group. A code would be assigned to that specific activity with a consensus in the group discussion.

We believe that obtaining field data on principal time use is the best approach to learn and understand how principals spend their work time. Yet, this approach has its own limitations. First, this study did not capture principals' time spent working outside their work days, and it should be acknowledged that most principals work more than the standard 40 hours per week. Second, sometimes the job required the principals to multi-task. However, for our data analyzing purpose, we only recorded the primary task. Third, although principals were encouraged to share the contents with our researchers when they were working on computers, not all information was disclosed. Our researchers did not make assumptions on the nature of the task if principals decided not to share of their computer works, and these time spent on undisclosed emails or computer work were grouped with other personal activities such as eating, using bathrooms in the personal category. Therefore, it might lead to an upward-bias on principals' time spent on this category. Last but not least, although principals were agreed to disregard our researchers and perform as usual, we could not completely rule out the possibility of any observer effect, in which principals might alter their daily routine or the length of time spent on certain activity for any reason. To address

this concern, we would recommend conducting a follow-up survey on principals' believes on which of their activities are more correlated to better student performance. We expect to discover a higher discrepancy between self-reported believes and actual observed data for those principals who performed their daily routine when observed, while a lower discrepancy would be found for those principals who might potentially suffer from this observer effect. This is because for those principals who had the incentive to alter their behaviors, they would tend to put more effort into those activities that they believed will promote student outcomes. Also, we assume that the chances of principals altering behaviors may be higher in those schools with relatively poor student performance. If this study were replicated, efforts should be made in addressing these above matters.

3.3.2 Student Performance Data

We complemented our observational data with student performance data from the Georgia Criterion-Referenced Competency Tests (CRCT) and the End of Course Tests (EOCT). Both of these state-standard tests are widely adopted in educational literatures as assessments of student performance. The CRCT are given to students from grade one through eight, measuring specific skills that are essential for continuing academic progress in each core subject such as math, reading, science, social studies, and English/language arts. The EOCT are criterion-referenced tests adopted by all high schools in Georgia as part of the College and Career Readiness Performance Index (CCRPI), and these tests include subjects of 9th-grade literature and composition, physical science, and algebra. All these scores are reported in percentages of students meets, exceeds, or do not meet the state's expectations by grade levels and subjects . These school-level student performance records can be found on the website of Fulton County Schools, National and State Assessments 2015.

We used the CRCT scores of reading and math in 5th and 8th grades as assessments for student performance in elementary and middle schools, respectively. For high schools, we used EOCT scores of 9th grade literature and composition and algebra. Hence, we have

two evaluation criteria for student outcomes, one on language and the other on math. We obtained a longitudinal data of the 30 sample schools for two school years from 2012 to 2014. The mean value of the percentage of students meet or exceeds the expectation on the language criterion was 93.14, with a standard deviation of 8.33. The mean value of the percentage of students meet or exceeds the expectation on the math criterion was 70.98, with a standard deviation of 28.81.

We also obtained school characteristics data for each sample school from Fulton County School Accountability Office, including student gender, ethnicity, status on free or reduced lunch program, status on special education needs, and student English proficiency level. We treated these data as a series of binary variables. The gender dummy equals to 0 for male students and 1 for female students. The race dummy equals to 0 for white students and 1 for students of all other races. We used student status on free or reduced lunch program as a proxy of their family income, and that dummy variable equals to 1 if a student qualifies for free or reduced lunch. The dummy variable of student status on special education needs equals to 1 for students with disability and those who require special education needs. For the dummy variable of student English proficiency, it equals to 1 if a student has limited English proficiency, or is being monitored because of English proficiency, and it equals to zero if a student is not eligible or no longer monitored. We regressed student performance on math and language separately as functions of principal time use in a fixed effect model, controlling for school characteristics. Results are presented in the next section. A limitation of this method is that although we were able to identify the correlation between principal activities and student performance, we were not able to determine the causality between them. This is a common issued faced by this type of research, and it requires more advanced econometric tools and theory support.

3.4 Results

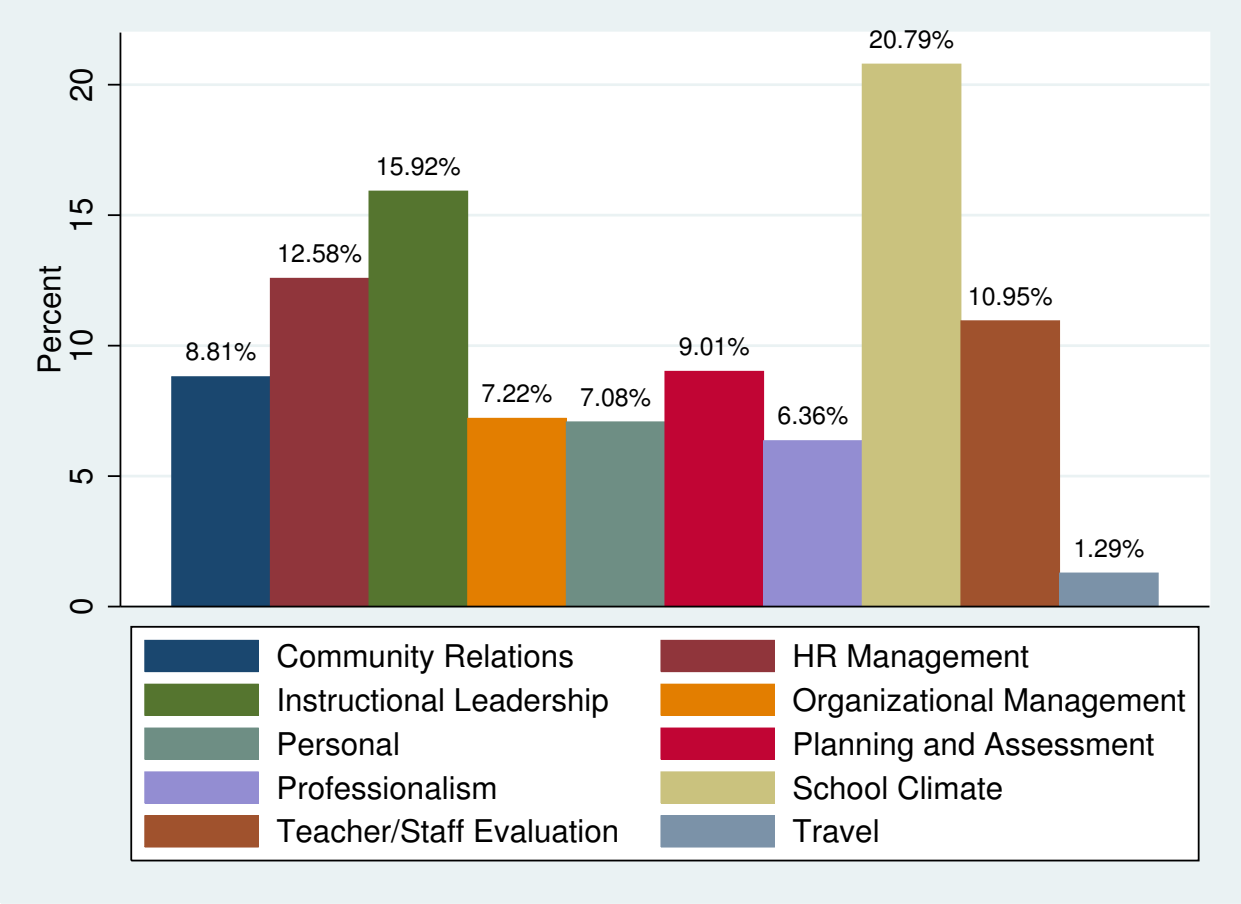
3.4.1 What Do Principals Do in a Typical Work Day

By analyzing our observational data, we are able to answer the first research question of how principals spend their time at work. In general, principals spent most of their time at work, about 20.79%, on building and maintaining school climate, such as talking with parents, students, teachers, and staff, and rewarding students. Principals' time spent on instructional leadership ranked the second, which was about 15.92% of their total work time. This category included all principal actitives realted to improving and developing school curriculum, such as analyzing school achievement data, attending grade level meetings, and identifying needs to design, revise, and monitor instruction, etc. Principals' time spent on human recourse manangement and teacher/staff evaluation ranked at the third and fourth place among the 10 categories, respectively. This implied that another important aspect of principal's leardership role was organizing and managing school staff resources, addressing employee concerns, evaluating and providing opportunities for employee advancement. On average, principals spent similar amount of time on other categories, such as communication and community relation (establishing community partnerships), school planning and assessment (developing school visions and plans), professionalim (personal professional development), organizational management (managing school financial recources and facilities), and the personal task (addressing personal issues), except for traveling to off-site meetings. These results are presented in Figure 3.1.

3.4.2 How Do Principals' Activities Vary by School Levels and Learning Communities

To analyze how principals' activities vary by school levels, we first separated the 30 schools into three groups according to their school levels. There were 10 schools in each

Figure 3.1: Percentage of principal time spent on each category - aggregated



group at the elementary, middle, and high school levels. We found that principals spent most of their time on building and maintaining school climate, and this was true for all school levels. Especially, high school principals spent 24.75% of their work time on this task, while elementary and middle school principals spent 18.26% and 19.90% of their time, respectively. This implied that buidling school culture and maintaining good relaionship with school employee, students and parents were an important aspect of principal's leadership role for all schools. The second largest amount of time spent was on the instructional leadership task for elementary and middle school principals, with 14.88% and 19.23%, respectively. For high school principals, this was the HR management task, which took 13.69% of their work time. This implied that for lower level schools such as elementary and middle schools, being an instruction learder was essential for principals, while managing school employee was a heavier duty for high school principals. The third largest amount of time spent by elementary principals was on teacher and staff evaluation, which was 14.75%. For middle and high school principals, that was HR management (12.01%) and instructional leadership (13.55%), respectively. All these findings showed that the three major roles for principals were building school culture and climate, improving and developing curriculum, and mangaing school emplyee resouces, although principals may vary the weight they put on these tasks acoording to their school levels. Figure 3.2, Figure 3.3, and Figure 3.4 describe principals time spent on each category at all three school levels.

Each public school in Fulton County belongs to a learning community based on their geographic location, and each learning community has its distinct characteristics. Table 3.1 presents the summary statistics of the student body in our school samples by each learning community. It is noticeable that the Northwest Learning Community has the largest percentage of white students, and has the lowest percentage of students qualified for free or reduced lunch program. The Northeast and Central Learning Communities are with higher percentages of minority students and students qualified for free or reduced lunch program. In the South Learning Community, 99.29% of the students are non-white, and

Figure 3.2: Percentage of principal time spent on each category - elementary school

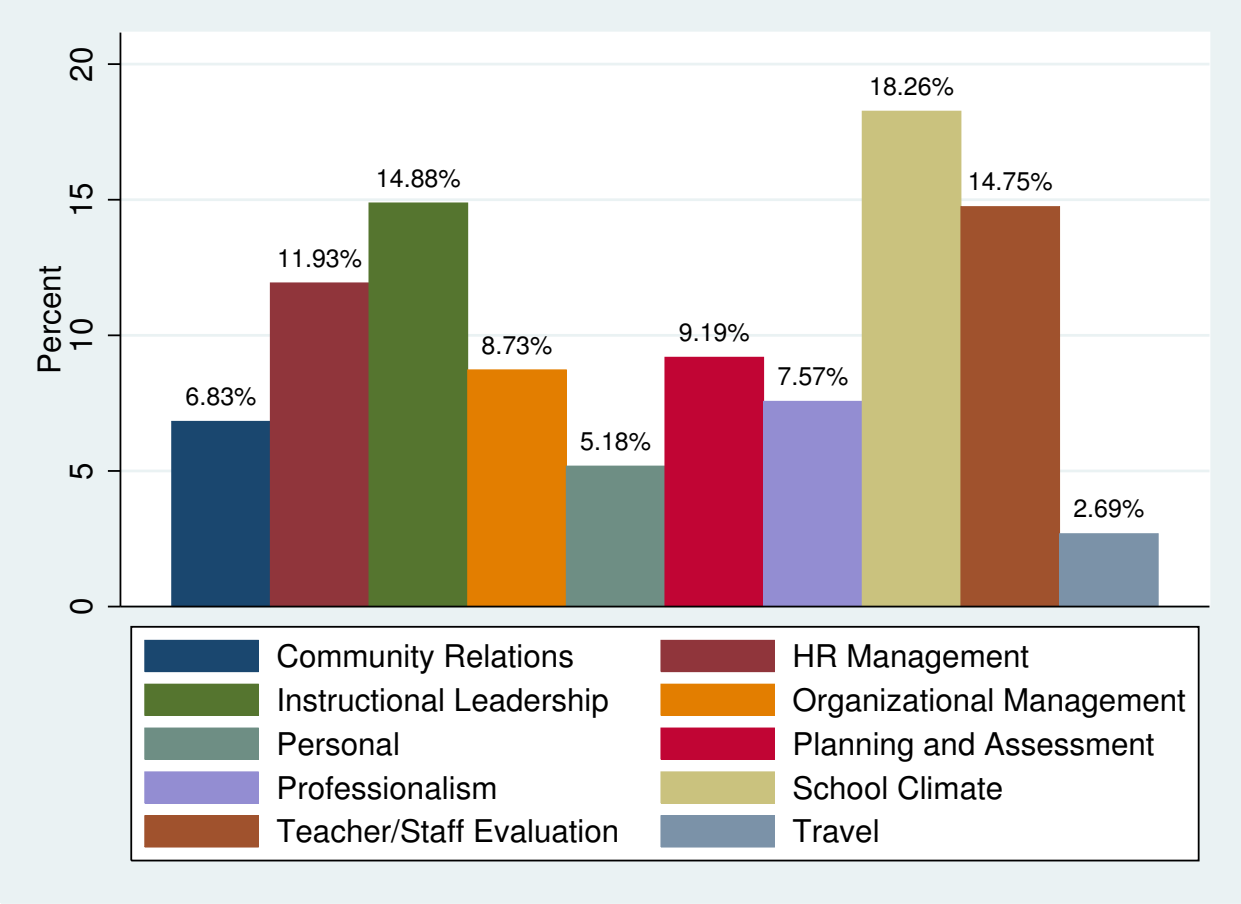


Figure 3.3: Percentage of principal time spent on each category - middle school

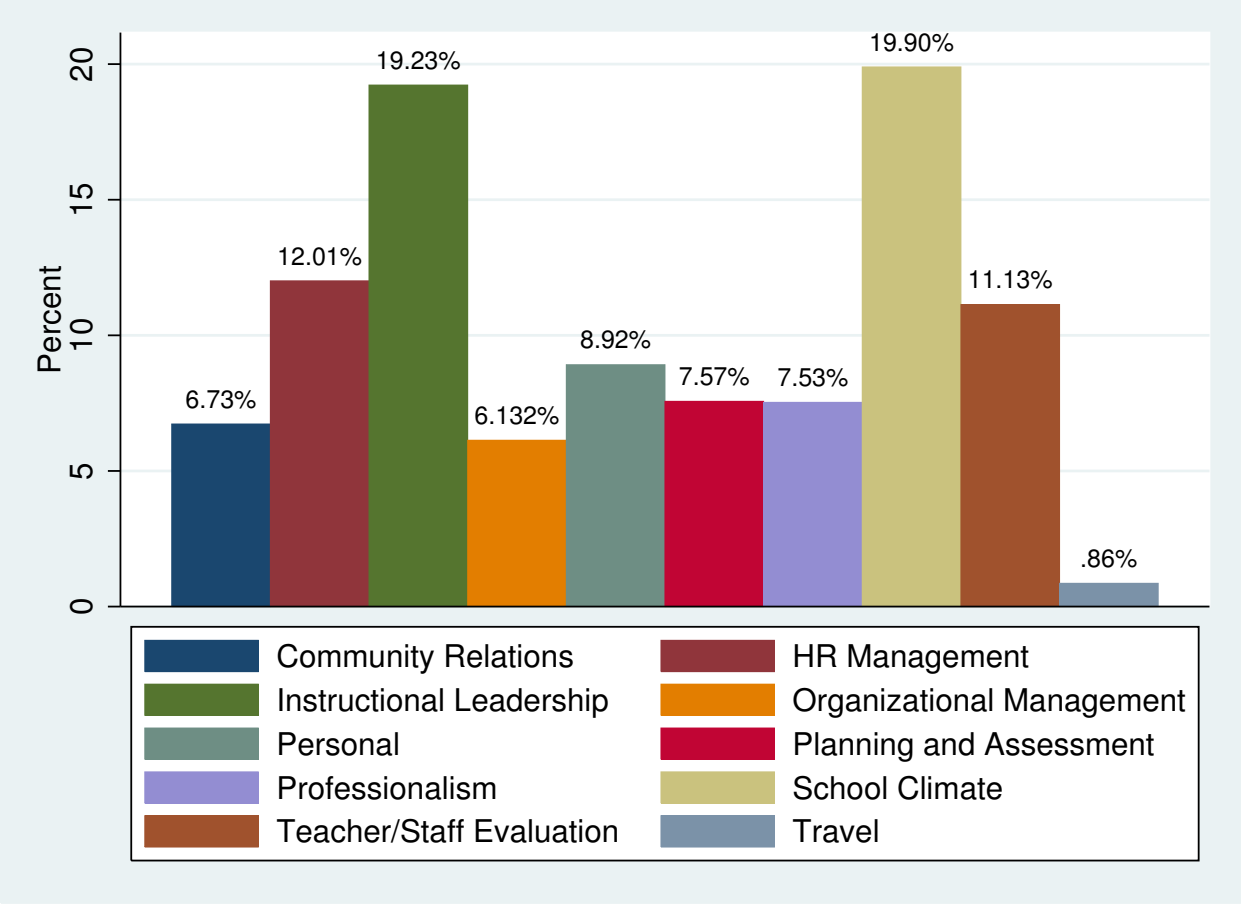


Figure 3.4: Percentage of principal time spent on each category - high school

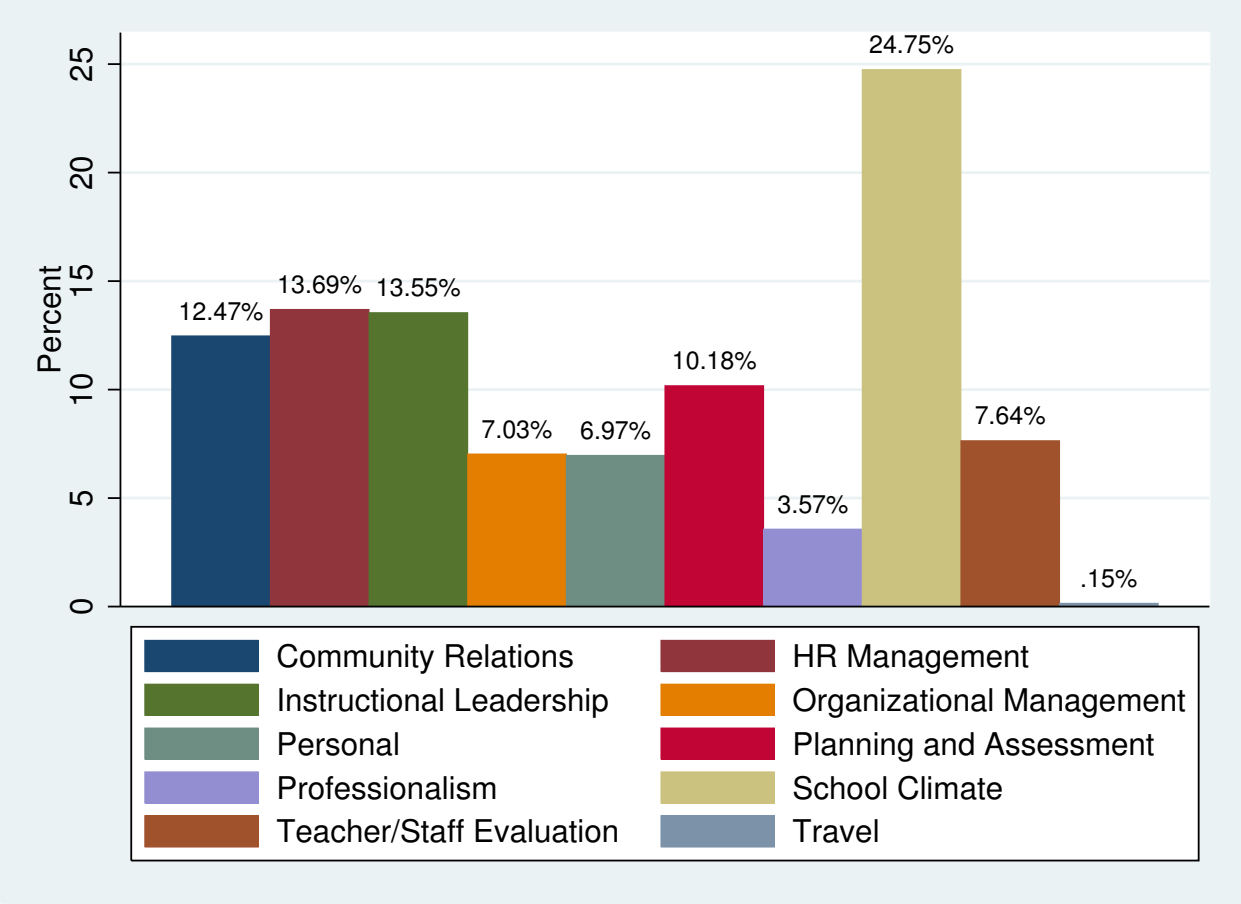


Table 3.1: Learning community summary statistics

Learning Community	Female	Non-white	Free/Reduced lunch	Disability	Limited English
Northeast	48.46%	50.14%	21.31%	8.85%	4.60%
Northwest	49.84%	35.76%	12.05%	8.00%	2.71%
Central	51.49%	58.65%	48.24%	6.72%	4.67%
South	49.98%	99.29%	83.90%	12.45%	0.94%

83.90% percent of students qualify for free or reduced lunch program.

We took advantage of this widely spread geographic range and diverse student demographics. To analyze how principals' time spent on each activity varied by learning communities, we clustered our sample schools according to the learning communities they belonged to. Figure 3.5, Figure 3.6, Figure 3.7, and Figure 3.8 describe principals time spent on each of the ten categories in each learning community. We found that principals in different learning communities had diverse patterns on how their time was used. Firstly, although principals in all learning communities spent most of their time in activities related to building school climate, principals of the Northeast Learning Community spent the largest of amount of time in this category while principals of the Northwest Learning Community spent the lowest, which were 23.93% and 17.71%, respectively. Secondly, instructional leadership ranked the second highest category in principals' time use for all learning communities expect in the Northeast Learning Community, where HR management took 11.81% of principals' work time. Thirdly, principals in different learning communities had various categories as their third highest time spent category. For Northwest and Central Learning Communities, teacher and staff evaluation took 14.32% and 11.36% of principals' total work time, while in Northeast and South Learning Communities these categories were instructional management (11.15%) and HR mangangement (15.40%), respectively. Lastly, we noticed that none of the principals in the South Learning Community traveled for any off-site meeting during our two observational periods, while principals of all other learning communities did.

Figure 3.5: Percentage of principal time spent on each category - Northeast Learning Community

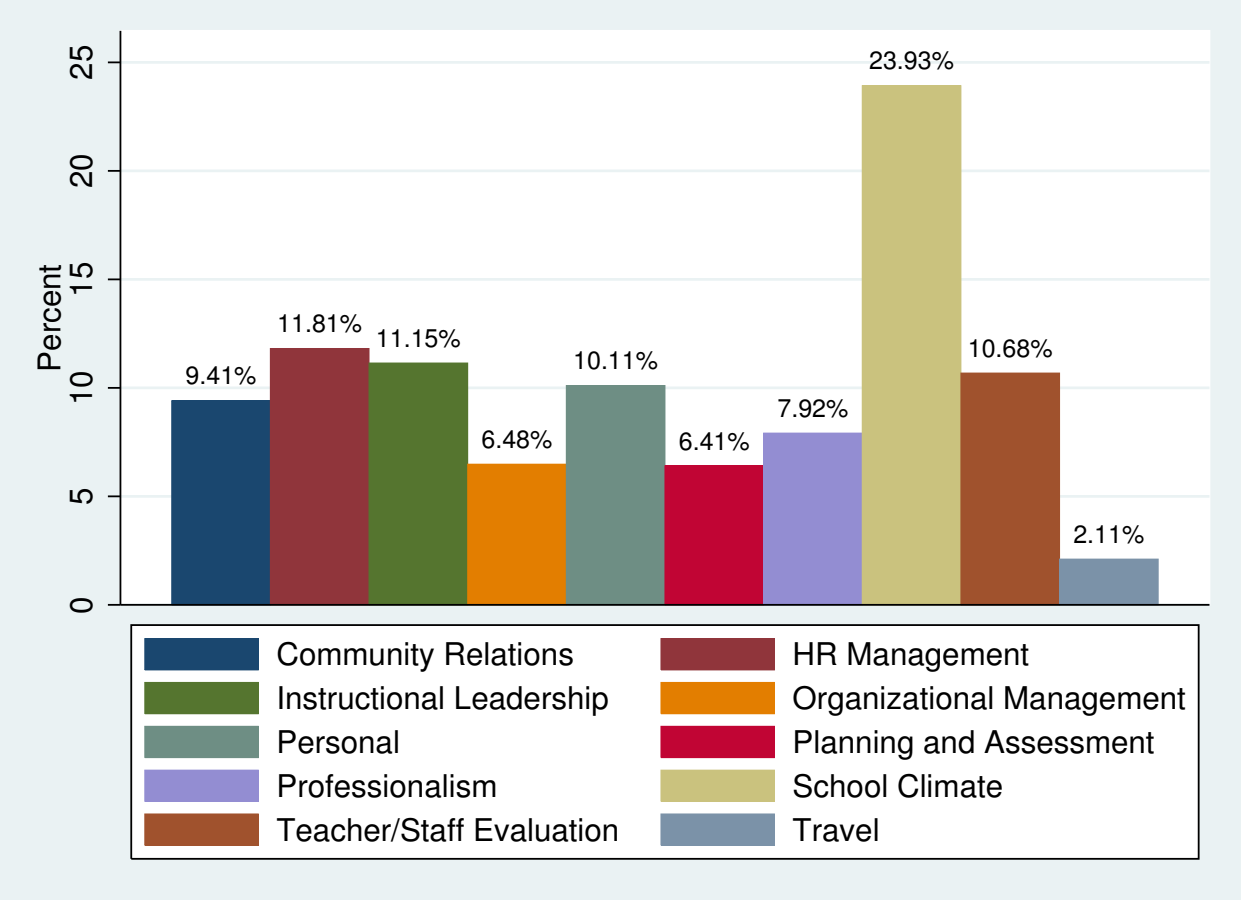


Figure 3.6: Percentage of principal time spent on each category - Northwest Learning Community

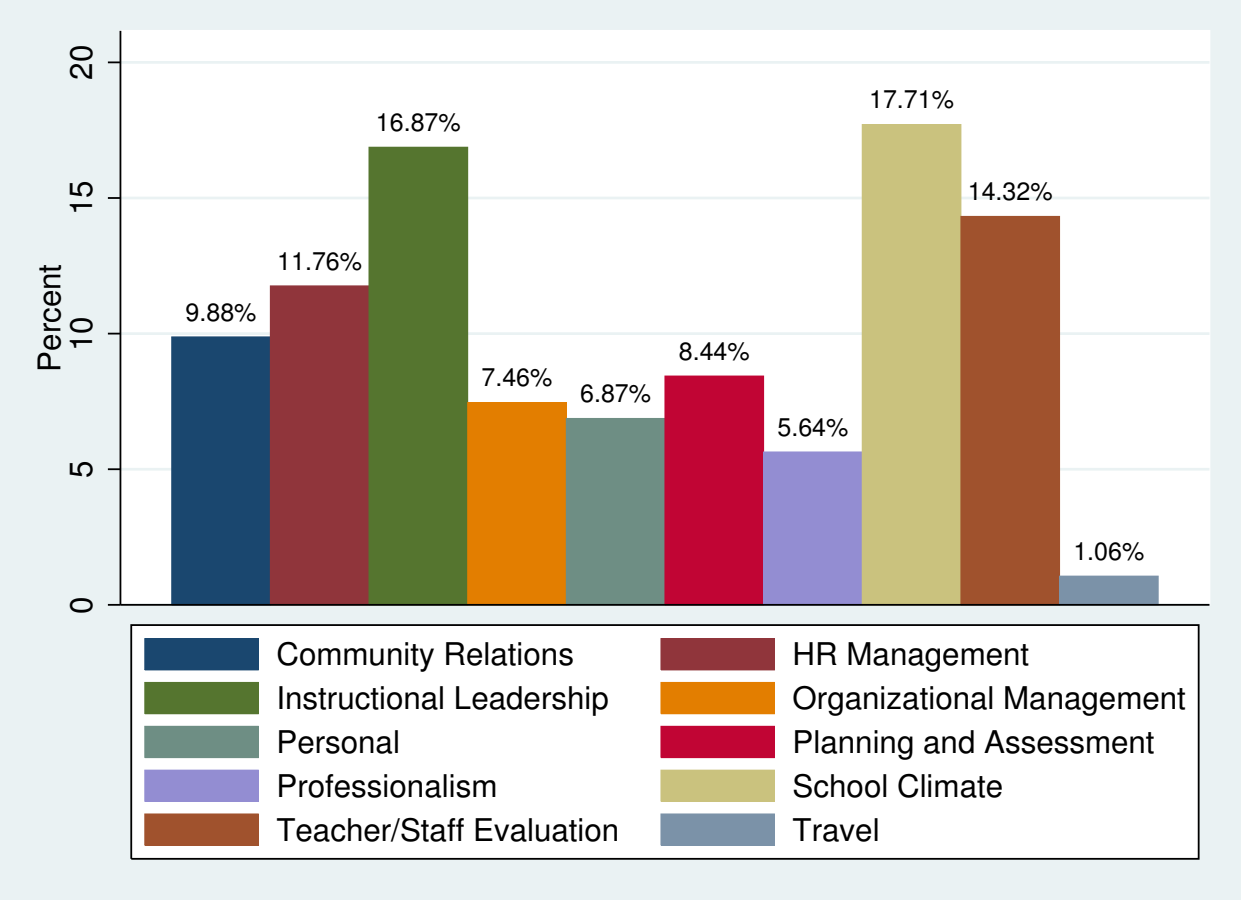


Figure 3.7: Percentage of principal time spent on each category - Central Learning Community

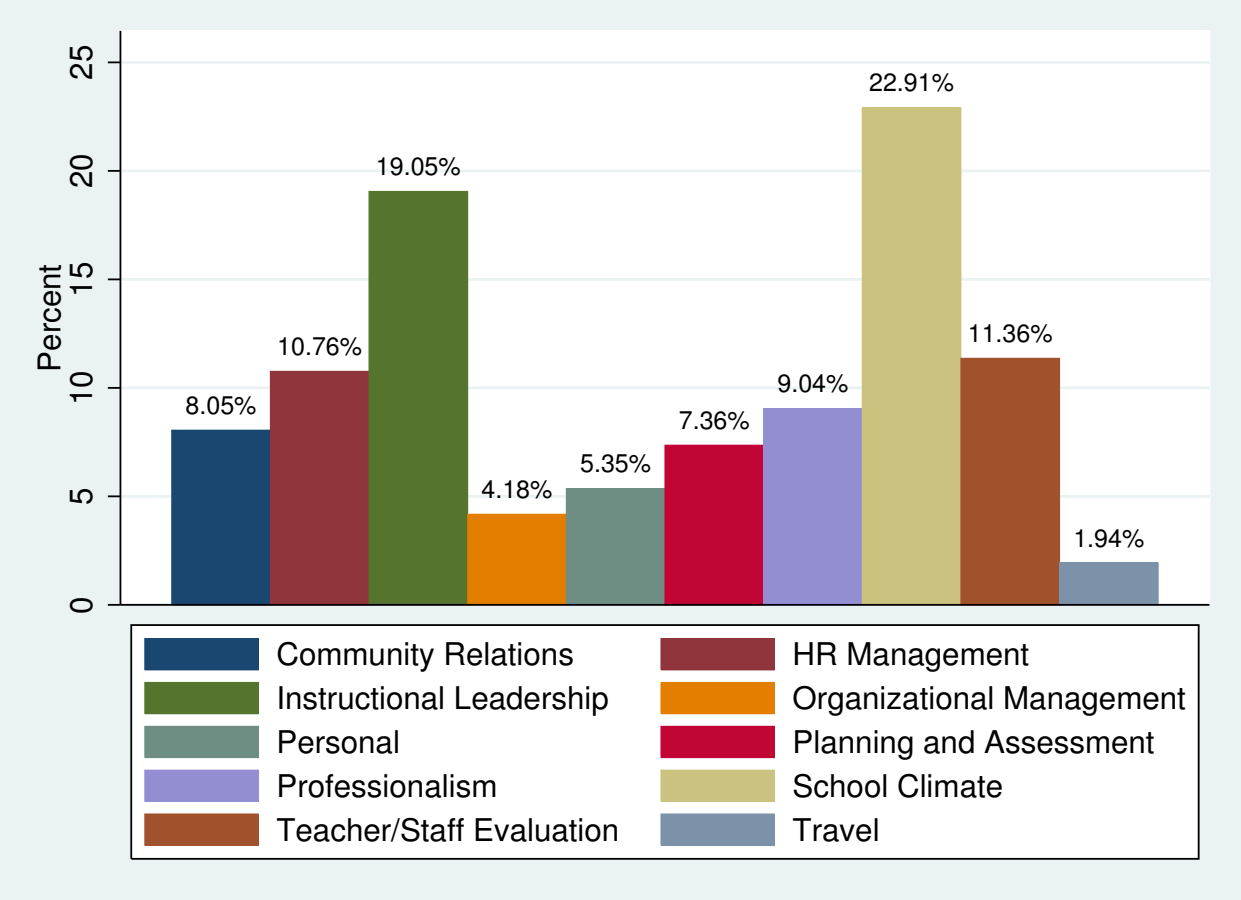
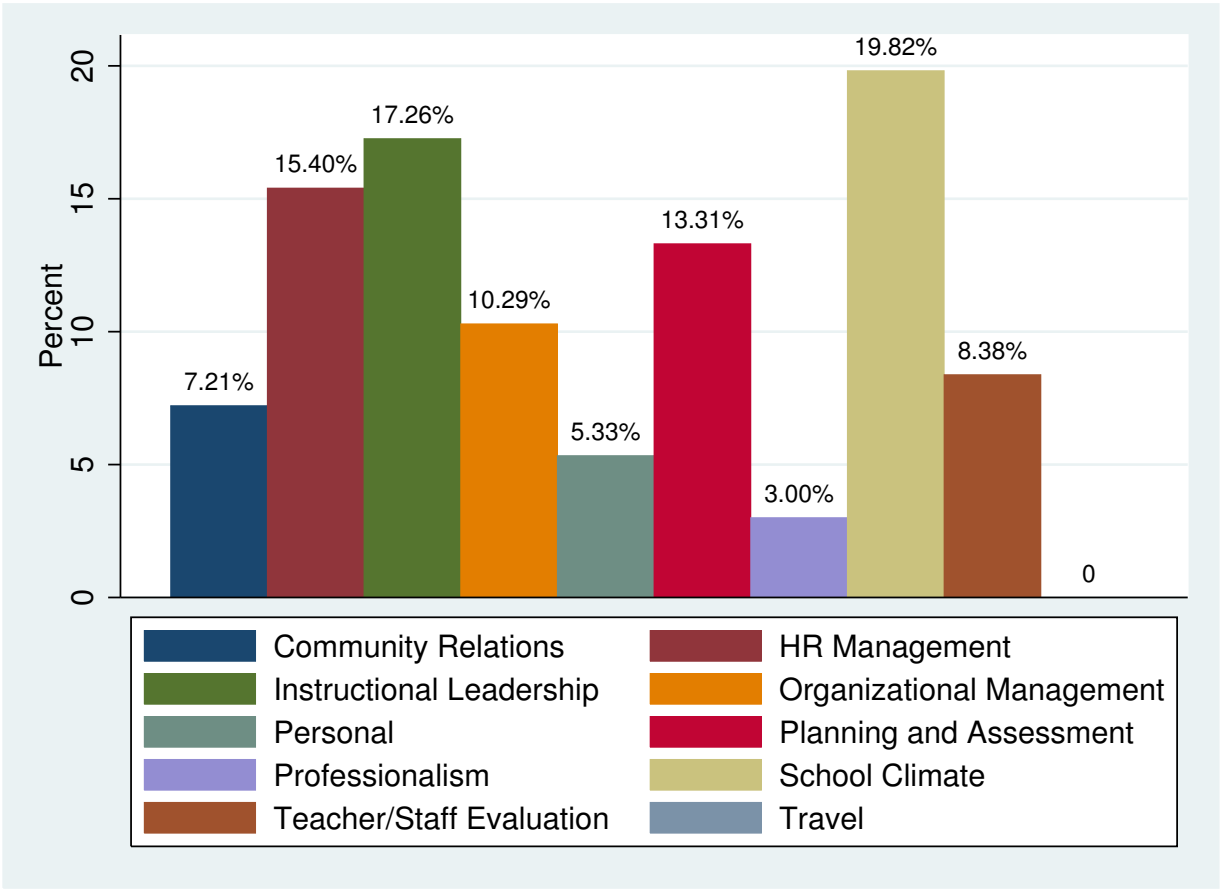


Figure 3.8: Percentage of principal time spent on each category - South Learning Community



3.4.3 How Does Principals' Time Use Influence Student Performance

We complemented our observational data with student performance data from the CRCT and EOCT scores on math and language for all sample schools. We used student performance as the dependent variable and principal time spent on each category as explanatory variables, and controlled for school characteristics. Results in Table 3.2 show that principal time spent on activity tasks related to instructional leadership, school climate, teacher and staff evaluation, and community relations were associated with better student performance in both subjects of math and language. Especially, principals' time spent on school climate and teacher and staff evaluation had the largest influence in improving student performance on both tests, and these effects were significant at the 1% level. On the contrary, principal time spent on organizational management and school planning and assessment were negatively related to student performance in math and language tests. Principals' time spent on professionalism category had no significant impact on student math score, while it positively influenced student language test score. Principals' time spent on personal issues had a positive impact on student math score, but it did not influence student performance on language test. Principals' time spent on traveling had a mixed effect on student performance. It was positively associated with student math score, but negatively associated with student language score. These results implies that different principal leadership styles have various influence on student outcomes. Especially, principals impact their school and student performance in a way through building school culture and climate as well as accommodating school employees.

3.5 Discussion

We conducted a principal motion study in Fulton County, Georgia and shadowed 30 school principals from all levels of public K-12 schools for two work days. We logged and

Table 3.2: Effect of principal time use on student performance

VARIABLES	(1) Math	(2) Language
Instructional Leadership	0.287***	0.139***
	(0.0924)	(0.0304)
School Climate	1.432***	0.593***
	(0.148)	(0.0488)
Teacher/Staff Evaluation	0.938***	0.316***
	(0.102)	(0.0335)
HR Management	0.535***	0.238***
	(0.122)	(0.0403)
Organizational Management	-0.830***	-0.255***
	(0.121)	(0.0398)
Planning and Assessment	-0.491***	-0.242***
	(0.136)	(0.0448)
Community Relations	0.286**	0.103**
	(0.130)	(0.0427)
Professionalism	0.0983	0.315***
	(0.195)	(0.0643)
Personal	0.773***	-0.0636
	(0.150)	(0.0494)
Travel	0.628**	-0.336***
	(0.301)	(0.0991)
Constant	-23.95*	58.52***
	(11.97)	(3.938)
Observations	60	60
R-squared	0.984	0.979

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

coded principals' activities into 10 broad categories. We linked these observational data with student performance data from state-wide CRCT and EOCT scores in subjects of math and language. Results of this study show that (1) principal's leadership role contains multiple aspects, (2) principals' time use varies among different school levels and school characteristics, and (3) principals' time spend on building and maintaining school culture and school climate, as well as evaluating teachers and school staff are positively related to student performance. These results suggest that principals should put their work focus on building and maintaining a good school culture and school climate, as well as providing opportunities for school employee development, which will ultimately improve and lead to better student academic outcomes.

Conclusion

This dissertation employs laboratory and field experiments to study factors and institutions in the real-world and their impacts on individual decision making. The first essay utilizes a laboratory experiment that includes three factors in human interactions including noisy environment, indefinite length of interaction, and various levels of communication to analyze their impact on individual decision on cooperation. Results of this study show that subjects are less cooperative in a noisy environment, and communication via fixed messages is not a remedy for the low cooperation rate in such environment. Although free message delivers similar contents of information on subject strategies, it leads to a distinct outcome compared to communicating through fixed messages. Subjects are 32.2% more likely to cooperate with their partners when they can communicate freely compared to no communication. Free communication not only increases cooperation between subjects significantly, but also maintains the cooperation rate at a high level over time. Results from this study also show that subject learn to cooperate over time. If a suject has interacted with a cooperative individual before, he or she is more likely to cooperate with other individuals at a later time.

The second essay aims to answer the research question of what kind of institution particularly fosters individual giving in China. We conducted a field experiment with five distinct public recognition treatments to investigate the effect of public recognition on individual charitable giving. Results of this study show that both the donation amount and participation rate are significantly higher when we mandated recognition. However, public recognition offered before donation crowds out small donations and thus lowers the participation rate. Results of this paper reveals the rationale behind the commonly accepted form of donation with mandatory public recognition in schools, governments and other public sectors in China. It also suggests that charitable organizations should adopt public recognition if the goal is to elicit larger contributes from a single donor, but should avoid public recognition if they plan to attract more donors.

The third essay is based on a field experiment on principals' time used and the impact on student outcomes. Results of this study show that principal time spend on activity tasks related to instructional leadership, school climate, teacher and staff evaluation, and community relations are associated with better student performance in math and language. Especially, principals' time spend on school climate and teacher and staff evaluation have the largest impacts. On the contrary, principal time spend on organizational management and school planning and assessment are negatively related to student performance. Other activities such as professionalism, personal, and traveling have undetermined effects on student performance. These results imply that principals affect their school and student performance in a more indirect way through building school culture and climate as well as accommodating school employees.

On the whole, this dissertation employs laboratory and field experiments to study real world phenomenons. Results of this dissertation aim to provide practical insights for individuals as well as for policy makers.

Appendix A

Sample Experiment Instructions

The following are the experiment instructions used for Free-message Treatment. Instructions in the No-message and Fixed-message treatments are generally the same except in the related part of communication.

Welcome

Thank you for participating in this decision-making experiment. Please read the following instructions carefully.

No Talking Allowed

Once the experiment begins, you are not allowed to talk. If you have any question, please raise your hand and an experimenter will approach you to answer your question in private. Also, usage of cell phone or other personal electronic devices is not allowed during the experiment. Please turn off your cell phone now. Disruptive individuals will be asked to terminate the experiment and leave the room.

General Instructions

1. This experiment contains a series of interactions between you and other participants in the room.

2. In each interaction, you will be randomly paired with another person for a sequence of rounds. Each sequence of rounds is referred to as a match. You will be paired with the same person during a match.

3. In each round, you and the person you are interacting with can choose one of two options, A and B. These options and the corresponding payoffs are shown in the screenshot on the next page.

   This screen will appear on your computer at the beginning of each round. The table on the left shows your payoff and table on the right shows the other person's payoff.

   For example, the table on the left indicates that if

   - you select A and the other selects A, you make \$0.6;

   - you select A and the other selects B, you make 0;

   - you select B and the other selects A, you make \$1;

   - you select B and the other selects B, you make \$0.2.

   The table on the right indicates that if

   - you select A and the other selects A, the other makes \$0.6;

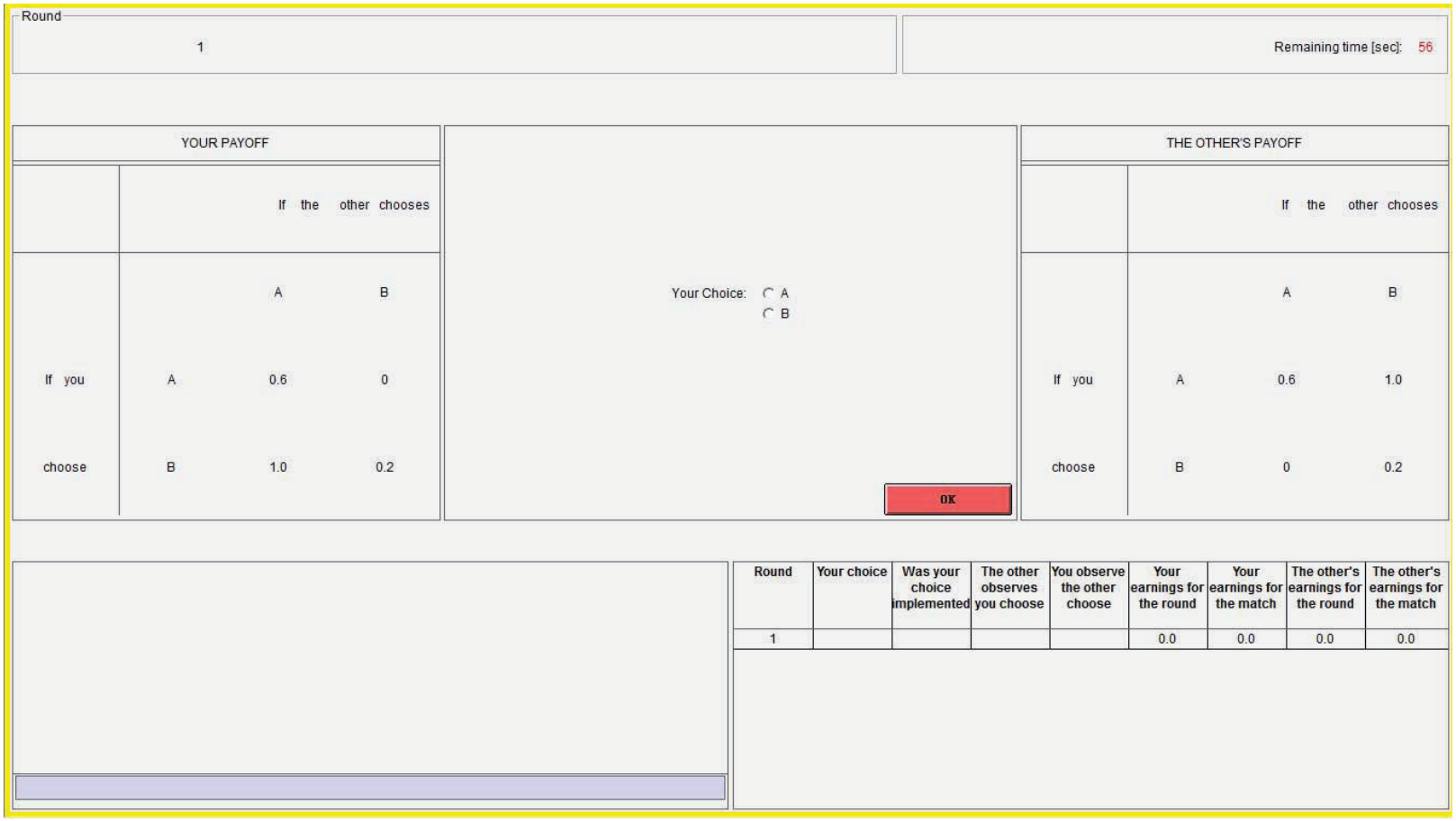
   - you select A and the other selects B, the other makes 1;

   - you select B and the other selects A, the other makes 0;

   - you select B and the other selects B, the other makes \$0.2.

   You have 60 seconds to make a decision in each round. The remaining time is shown at the top right corner of your computer screen.

4. In each round, there is a 7/8 probability that the option you choose actually occurs. However, with probability 1/8, your choice is changed to the opposite of what you have selected. For instance, when you select A, there is a 7/8 chance that you will actually play A, and 1/8 chance that instead you play B. The same is true for the


Round
1
Remaining time [sec]: 56
YOUR PAYOFF
If the other chooses
A
B
If you
A
0.6
0
choose
B
1.0
0.2
Your Choice:
A
B
ok
THE OTHER'S PAYOFF
If the other chooses
A
B
If you
A
0.6
1.0
choose
B
0
0.2
Round
Your choice
Was your choice implemented
The other observes you choose
You observe the other choose
Your earnings for the round
Your earnings for the match
The other's earnings for the round
The other's earnings for the match
1
0.0
0.0
0.0
0.0

other person. Whether your choice is reversed or not has nothing to do with the other person's choice being reversed or not. Notice that both you and the other person are informed of the moves which actually occur. Neither of you is informed of the intended choice of the other. Therefore when you observe the other person's choice, remember that with 1/8 probability this may not be that person's intention.

5. There will be at least 8 rounds in each match. After the 8th round, there is a 7/8 chance that the match will continue for another round. For example, if you are in rounds 1-7, it is certain that there will be a following round. If you are in round 8, the probability that there will be a 9th round is 7/8, so is in round 9 and so on. The number of current round is shown on the top left corner of your computer screen.

6. In each round, you are allowed to chat with the other person through the dialogue window on the bottom left of your computer screen. Sending or receiving messages has zero cost to you or the other person. Note that no foul or profane language shall be used or you will be asked to terminate the experiment and leave the room.

7. Information such as your choice, whether your choice is implemented or not, what the other person observes you choose, your observation of the other's choice, your earnings of each round and the match, the other person's earnings of each round and the match are presented to you at the bottom right of your computer screen.

8. Once a match ends, you will be randomly paired with a different person for a new match.

Payments

What you earn in this experiment depends partly on your decisions, partly on the other people's decisions, and partly on chance. Please make sure you fully understand the instructions, which may help you earn more in this experiment. You will be paid in cash at the end of this experiment. Your payment contains two parts. First, you will be paid $10 for

showing up for this experiment. Second, you will be paid for what you have earned in the experiment. At the end of this experiment, your earnings from one of the matches will be randomly selected as your payment of the experiment. The exchange rate is: 1 experimental dollars = 3 US dollars. Since your earning of any of the matches can be selected as your payment for the experiment, you need to treat every match seriously.

Appendix B

Demographic Statistics by Treatment

Treatment	Female	African American	Average age
No msg.	37.5%	52.5%	21.7
Fixed msg.	52.5%	62.5%	20.5
Free msg.	52.5%	47.5%	20.7
No msg. no noise	70%	50%	20.6
Free msg. no noise	55%	50%	21.3

Appendix C

Selected Subjects' Messages in the Free-message Treatment

Group 1.

Subject A: Hello.

Subject B: Hey.

Subject A: What are you picking? We both can't get 1. To maximize our gains we should both pick A.

Subject B: We should pick A every time cuz on average we will both get .6.

Subject A: Yup yup.

Subject B: Ok were on the same page. lol. A every time.

Group 2.

Subject A: I miss our team :(

Subject B: Me too.

Subject A: A?

Subject B: Communication is key. What are we going to pick?

Subject A: Both pick A.

Subject B: Deal my love.

Subject A: Deal :)

Group 3.

Subject A: Sorry that was reversed.

Subject B: I pick b you pick a.

Subject A: Pick b and I'll pick a.

Subject A: Yes.

Appendix D

Selected Subjects Self-reported Strategies

The post-experiment questionnaire included an open-ended question that asked for subjects' strategy or strategies used. Following are some of the subject responses.

1. No-message treatment.

- I choose option A to start because we both would earn .6 but once they switch to B i do also.
- I usually tried to pick A so we both can get paid but if the other person choose B often I would pick B.
- I chose A initially to try to get the other person to agree to choose A with me. My strategy was to try to maximize both our payoffs to .6 each round. Unfortunately, human nature always wants more.
- 2 As, then Bs until the other picks 2 As in a row, then A until the other picks 2 Bs in a row.
- B, because no matter the other person's option you would still get money

- I chose mostly B, and then I would chose A every few rounds. There was almost always a chance to make some money with this pattern..

2. Fixed-message treatment

- I chose to sent the “I will choose A" option, and then proceeded to choose B. If the other person believed me, then I would be rewarded one point. If they failed to believe me, then I would still receive .2 points.

- Most people chose option B for at least the .2. I tried to manipulate participants by saying I will choose A (to bait opponent choice A) and then choose B. But nobody was having that -_-

- I chose option A because it made more money. I trust that the other person will choose A too. If they lie then i will keep picking B

- I would ask the person first to go with A because of the fairness of the payout, but if I would not get a response I would choose B in order to make sure I was covered, meaning I would not lose points, like if I would of chose A.

- I chose A's whenever the other person said they were also choosing A's and continued to do so. I chose B if there other person continued to chose B no matter what they said, or they said they would chose B.

- I chose various options based on the response I got from the person prior to making the final decision of each round. It was based on trust and if that person actually chose the answer that they said they would choose.

- I started off choosing A to establish trust but when that was broken more than once I resorted to B.

3. Free-message treatment

- Mostly A because after discussing with the opponent, we realized that A would give us both an equal and good payout. However, people cheat. So sometimes the answers changed.
- I choses A because on average it maximized profit and because we got to speak to the other person there was minimal risk.
- I tried my best to stick to us both choosing A. Both in mathematics and fairness, we would both be better off that way. When the computer picked a different choice for us, we tried to even out our payoffs.
- I discussed with the other person to either alternate so we would both get 1 point or choose A so that we would get the .6. Sometimes I would just choose B to see if I got the 1 point if the other person did not try to contact me
- I tried to stay even with my partner, but at times I got greedy and keep getting points for myself.
- We both chose to do both A unless one of us got screwed with the reversing, then we agreed to even it up and go back to both picking A.
- A and B, I tried to coordinate with the paired person so that we could both have a nice amount of money at the end of the match.

Appendix E

School Characteristics

Learning Community	Elementary	Middle	High	Total
Northeast	2	3	3	8
Northwest	3	2	2	8
Central	2	2	2	6
South	3	2	3	8

Appendix F

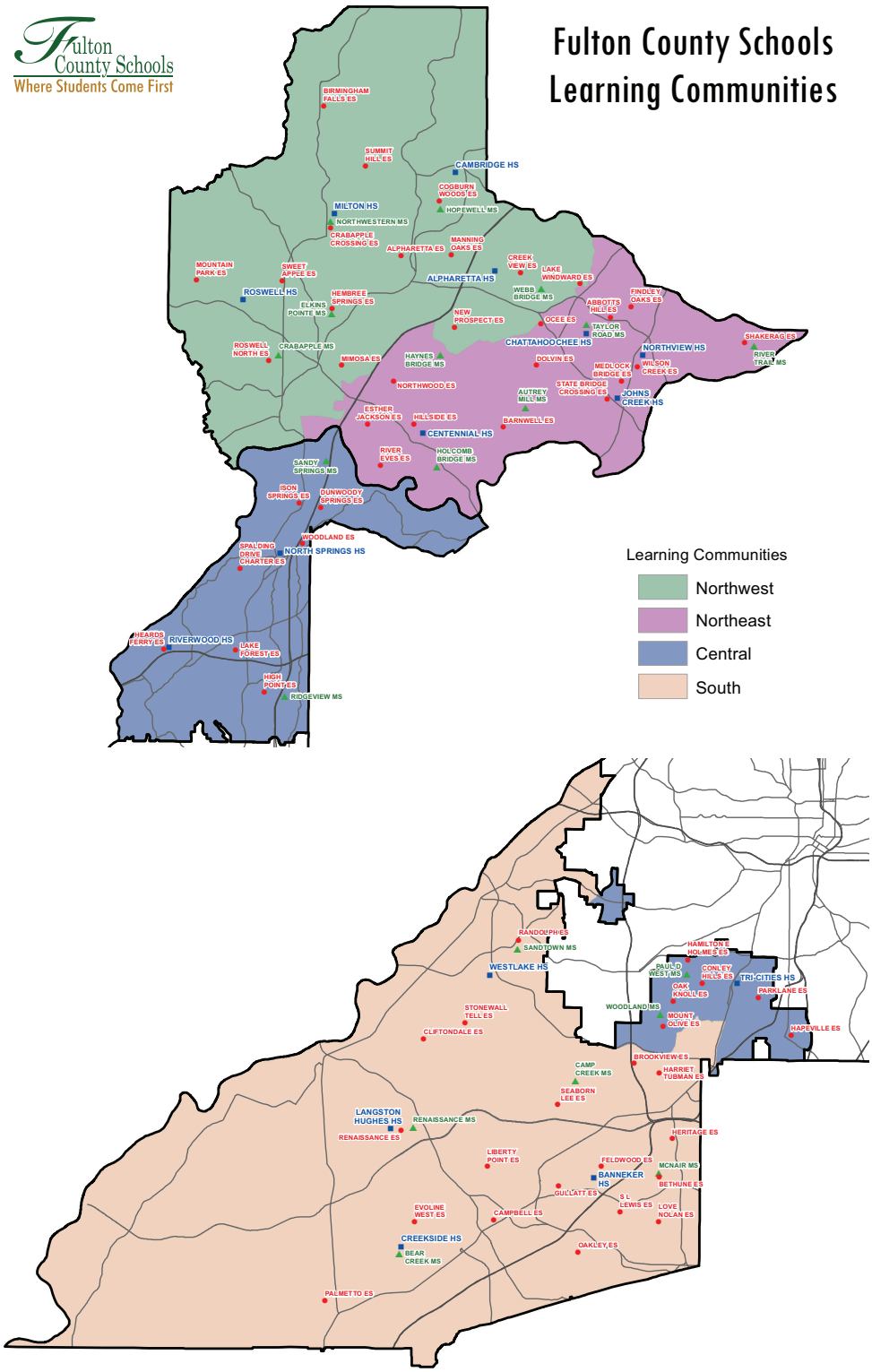
Principal Activity Codes

Category	Description
Instructional Leadership	Analyzing current academic achievement data Attending PLC/Grade Level/Content Area meetings Class/course scheduling Discussing school activities with leadership team Identifying needs to design, revise, and monitor instruction Implementing instructional best practices Improving inter-rater reliability with leadership Teacher walkthroughs and observations
School Climate	Building relationships with parents Building relationships with staff Building relationships with students Direct student supervision (lunch/hall/bus duty) Managing school safety Managing student discipline issues and policies Recognizing/rewarding students Setting/modeling school expectations and norms
Planning & Assessment	Assessing/responding to larger political context Developing a vision/School Improvement Plan for the school Identifying/assessing a child for special services Planning interventions for an individual student Program/curriculum development Promoting opportunities for an individual student

Category	Description
Organizational Management	Managing existing school finances and resources Managing school facilities Trying to acquire new resources
HR Management	Addressing employee concerns Managing staffing resources Motivating/recognizing/rewarding staff Planning/leading staff professional development Providing opportunities for employee advancement Recruiting/hiring/firing staff Supervising staff (directive/corrective action)
Teacher/Staff Evaluation	Examining evidence of employee performance Giving feedback to staff/coaching staff Implementing new performance management tools Sharing employee performance data with leadership team
Professionalism	Attending professional development Attending district trainings, meetings, and events Communicating/receiving expectations from the district Networking with other principals/colleagues Planning for the day/monitoring day's agenda
Community Relations	Attending athletic events Establishing community partnerships Involving stakeholders in school initiatives Planning athletic events/improving athletic program Planning community/school events Sharing information with stakeholders
Personal	Eating Getting ready for next activity/preparing oneself Personal phone call/managing personal schedule Restroom Undisclosed emails/computer work
Travel	Travel to off-site meeting or event

Appendix G

Map of Fulton County Learning Communities


Fulton County Schools
Where Students Come First
Fulton County Schools
Learning Communities
BIRMINGHAM FALLS ES
SUMMIT HILL ES
CAMBRIDGE HS
COGBURN WOODS ES
HOPEWELL MS
MILTON HS
NORTHWESTERN MS
CRABAPPLE CROSSING ES
ALPHARETTA ES
MANNING OAKS ES
CREEK VIEW ES
LAKE WINDWARD ES
ALPHARETTA HS
MOUNTAIN PARK ES
SWEET APPLE ES
ROSWELL HS
HEMBREE SPRINGS ES
ELKINS POINTE MS
WEBB BRIDGE MS
ABBOTTS HILL ES
FINDLEY OAKS ES
NEW PROSPECT ES
OCEE ES
TAYLOR ROAD MS
CHATTAHOOCHEE HS
NORTHVIEW HS
SHAKERAG ES
RIVER TRAIL MS
ROSWELL NORTH ES
CRABAPPLE MS
MIMOSA ES
HAYNES BRIDGE MS
DOLVIN ES
MEDLOCK BRIDGE ES
WILSON CREEK ES
NORTHWOOD ES
STATE BRIDGE CROSSING ES
AUTREY MILL MS
JOHNS CREEK HS
ESTHER JACKSON ES
HILLSIDE ES
BARNWELL ES
CENTENNIAL HS
RIVER EVES ES
HOLCOMB BRIDGE MS
SANDY SPRINGS MS
ISON SPRINGS ES
DUNWOODY SPRINGS ES
WOODLAND ES
SPALDING DRIVE CHARTER ES
NORTH SPRINGS HS
HEARDS FERRY ES
RIVERWOOD HS
LAKE FOREST ES
HIGH POINT ES
RIDGEVIEW MS
Learning Communities
Northwest
Northeast
Central
South
RANDOLPH ES
SANDTOWN MS
WESTLAKE HS
HAMILTON E HOLMES ES
PAUL D WEST MS
CONLEY HILLS ES
TRI-CITIES HS
OAK KNOLL ES
PARKLANE ES
WOODLAND MS
MOUNT OLIVE ES
HAPEVILLE ES
STONEWALL TELL ES
CLIFTONDALE ES
BROOKVIEW ES
HARRIET TUBMAN ES
CAMP CREEK MS
SEABORN LEE ES
LANGSTON HUGHES HS
RENAISSANCE MS
RENAISSANCE ES
HERITAGE ES
LIBERTY POINT ES
FELDWOOD ES
MCNAIR MS
BANNEKER HS
BETHUNE ES
GULLATT ES
S L LEWIS ES
LOVE NOLAN ES
EVOLINE WEST ES
CAMPBELL ES
CREEKSIDE HS
BEAR CREEK MS
OAKLEY ES
PALMETTO ES

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Vita

Guanlin Gao was born on June 1, 1985 in Hebei Province, China. She graduated from Renmin University of China in 2007 with a B.A. in International Economics and Trade. In the same year, Guanlin moved to the United States to pursue her master degree at Central Michigan University at Mt. Pleasant, Michigan, where she received her M.A. in Economics, and other academic rewards such as Central Michigan University Fellowship, and Paul C. Mathis Memorial Scholarship in Economics.

Guanlin began her doctoral studies at Andrew Young School of Policy Studies, Georgia State University in Fall 2009. She worked as a research assistant for the Experimental Economics Center. Her research involves controlled laboratory experiments and field experiments with a focus on individual decision making. She also worked as an instructor at the Department of Economics. In addition to her academic works, Guanlin served as a student leader for the International Student and Scholar Service office at Georgia State University.

During her doctoral studies, Guanlin was invited to the 18th International Foundation for Research in Experimental Economics workshop as a visiting graduate student. She presented her work at the Southern Economics Association, Western Economics Association, and the Consortium for Research on Educational Assessment and Teaching Effectiveness's annual conferences. She received Andrew Young School of Policy Studies Dissertation Grant and Theodore C. Boyden Excellence in Teaching Economics Award.

Guanlin was awarded a Ph.D. in Economics by Georgia State University in 2015. Upon graduation, she begins working as a faculty at Judd Leighton School of Business and Economics of Indiana University South Bend.